ANNUAL REGISTER

OF THE

UNITED STATES NAVAL ACADEMY,

ANNAPOLIS, MD.

THIRTY-SECOND ACADEMIC YEAR.

1881-82.

WASHINGTON:
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1881.

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THE
UNITED STATES NAVAL ACADEMY.

The United States Naval Academy was founded in 1845, by Hon. George Bancroft, Secretary of the Navy, in the administration of President James K. Polk. It was formally opened October 10, of that year, under the name of the Naval School, with Commander Franklin Buchanan as Superintendent. It was placed at Annapolis, Md., on the land occupied by Fort Severn, which was given up by the War Department for the purpose. The course was fixed at five years, of which the first and last only were spent at the School, the intervening three being passed at sea. This arrangement was not strictly adhered to, the exigencies of the service making it necessary, in many cases, to shorten the period of study. In January, 1846, four months after the opening of the School, the students consisted of 36 Midshipmen, of the date of 1840, who were preparing for the examination for promotion; 13 of the date of 1841, who were to remain until drafted for service at sea; and 7 Acting Midshipmen, appointed since September of the previous year. The Midshipmen of the date of 1840 were the first to be graduated, finishing their limited course in July, 1846, and they were followed in order by the subsequent dates, until the reorganization of the School, in 1851.

In September, 1849, a Board was appointed to revise the plan and regulations of the Naval School. The Board was composed of the following officers:

Commodore William B. Shubrick,
Commander Franklin Buchanan,
Commander Samuel F. Dupont,
Commander George P. Upshur,
Surgeon W. S. W. Ruschenberger,
Professor William Chauvenet,
Captain Henry Brewerton, U. S. A.

The plan reported by the Board was approved, and went into operation July 1, 1850. The new organization provided for a course of seven years, the first two and last two at the School and the three intermediate years at sea. The School was placed under the supervision of the Bureau of Ordnance and Hydrography, and its name was changed to the United States Naval Academy. The corps of professors was enlarged, the course was extended, and the system of separate departments, with executive heads, was fully adopted. It was provided that a Board of Visitors should make an annual inspection of the Academy, and report upon its condition to the Secretary of the Navy. A suitable vessel was attached to the Academy as a practice-ship, and the annual practice-cruises were begun.

After the system had been in operation a year new changes were proposed, and the recommendations of the Academic Board on the subject were referred to the Board of Examiners of the year 1851, composed of the following officers:

Commodore David Conner,
Captain Samuel L. Breese,
Commander C. K. Stribling,
Commander A. Bigelow,
Commander Franklin Buchanan,
Lieutenant Thomas T. Craven.

The change recommended by the Board of Examiners, and adopted by the Department, consisted mainly in leaving out the requirement of three years of sea-service in the middle of the course, thus making the four years of study consecutive. The practice-cruise supplied the place of the omitted sea-service, and gave better opportunities of training. The change went into operation in November, 1851, together with other improvements recommended by the Board. The system has continued, with slight modifications, to the present time. The first class to receive the benefit of it was that which entered in 1851. Six members of this class completed the course in three years, and were graduated in June, 1854; the rest of the class followed in 1855.

In May, 1861, on the outbreak of the war, the Academy was removed to Newport, R. I. The three upper classes were detached and ordered to sea, and the remaining Acting Midshipmen were quartered in the Atlantic House and on board the frigates Constitution and Santee. In September, 1865, the Academy was moved back to Annapolis, where it has since remained.

When the Bureau of Navigation was established, July 5, 1862, the Academy was placed under its supervision; March 1, 1867, it was placed under the direct care and supervision of the Navy Department, the administrative routine and financial management being still conducted through the Bureau. On the 11th of March, 1869, all official connection with the Bureau came to an end.

The term of the academic course was changed by law, March 3, 1873, from four to six years. The change took effect with the class which entered in the following summer.

In 1866, a class of Acting Third Assistant Engineers was ordered to the Academy for instruction. The course embraced the subjects of steam-engineering, iron-manufacture, chemistry, and mechanics, and practical exercises with the steam-engine and in the machine-shop. This class was graduated in June, 1868, together with two Cadet-Engineers who had entered the Academy in 1867. After an interval of four years, in October, 1871, a new class of Cadet-Engineers was admitted. This class followed a two years' course, somewhat more extended than that of the class of 1868, and was graduated in 1873. In 1872 and 1873, new classes were admitted, the first of which left the Academy in 1874 and the second in 1875. By an act of Congress approved February 24, 1874, the course of instruction for Cadet-Engineers was made four years instead of two; and the new provision was first applied to the class entering the Academy in the year 1874. This class was graduated in June, 1878.

SUPERINTENDENTS OF THE NAVAL ACADEMY SINCE ITS FOUNDATION.

Assumed Command:

Sept. 3, 1845.—Commander Franklin Buchanan.
Mar. 15, 1847.—Commander George P. Upshur.
July 1, 1850.—Commander Cornelius K. Stribling.
Nov. 1, 1853.—Commander Louis M. Goldsborough.
Sept. 15, 1857.—Captain George S. Blake.
Sept. 9, 1865.—Rear-Admiral David D. Porter.
Dec. 1, 1869.—Commodore John L. Worden.
Sept. 22, 1874.—Rear-Admiral C. R. P. Rodgers.
July 1, 1878.—Commodore Foxhall A. Parker.
Aug. 2, 1879.—Rear-Admiral George B. Balch.
June 13, 1881.—Rear-Admiral C. R. P. Rodgers.

BOARD OF VISITORS, JUNE, 1881.

Rear-Admiral C. R. P. RODGERS, U. S. Navy, *President.*

Hon. JOHN F. MILLER, *Vice-President*	U. S. Senate.
Hon. J. T. MORGAN,	U. S. Senate.
Hon. JON. SCOVILLE,	House of Representatives.
Hon. THOMAS M. BROWNE,	House of Representatives.
Hon. OLIN WELLBORN,	House of Representatives.
Commodore S. P. CARTER,	U. S. Navy.
Medical Director JOHN M. BROWNE,	U. S. Navy.
Chief-Engineer C. H. LORING,	U. S. Navy.
W. M. CALDWELL, Esq.,	Newport, R. I.
D. B. McCREARY, Esq.,	Erie, Pa.
Rev. S. S. CUTTING, D. D.,	Westport, N. Y.
Captain JAMES PARKER,	Perth Amboy, N. J.
BEVERLY TUCKER, Esq.,	Washington, D. C.
W. J. BIBB, Esq.,	Montgomery, Ala.
F. W. LAURENCE, Esq.,	Brookline, Mass.

ACADEMIC CALENDAR.

1881-1882.

1881.			
Oct.	1.	Beginning of first term	Saturday.
1882.			
Jan.	23–28.	Semi-annual examination	Monday—Saturday.
Jan.	28.	End of first term	Saturday.
June	1–10.	Annual examination	Thursday—Saturday
June	10.	End of academic year, 1881–82	Saturday.
June	12.	Examination of candidates for admission as Cadet-Midshipmen	Monday.
Sept.	15.	Examination of candidates for admission as Cadet-Engineers	Friday.
Sept.	22.	Examination of candidates for admission as Cadet-Midshipmen	Friday.
Oct.	2.	Beginning of first term, 1882–83	Monday.

The academic months end on the following days:

1881–1882.

October	Oct. 29	February	Feb. 25
November	Nov. 26	March	Mar. 25
December	Dec. 24	April	Apr. 22
January	Jan. 21	May	May 27

1882–1883.

October	Oct. 28	December	Dec. 23
November	Nov. 25	January	Jan. 20

CALENDAR FOR 1881-'82.

SEPTEMBER.

Sun.	M.	T.	W.	T.	F.	Sat.
----	----	----	----	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	----

OCTOBER.

Sun.	M.	T.	W.	T.	F.	Sat.
----	----	----	----	----	----	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	----	----	----	----	----

NOVEMBER.

Sun.	M.	T.	W.	T.	F.	Sat.
----	----	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	----	----	----

DECEMBER.

Sun.	M.	T.	W.	T.	F.	Sat.
----	----	----	----	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

JANUARY.

Sun.	M.	T.	W.	T.	F.	Sat.
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	----	----	----	----

FEBRUARY.

Sun.	M.	T.	W.	T.	F.	Sat.
----	----	----	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	----	----	----	----

MARCH.

Sun.	M.	T.	W.	T.	F.	Sat.
----	----	----	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	----

APRIL.

Sun.	M.	T.	W.	T.	F.	Sat.
----	----	----	----	----	----	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	----	----	----	----	----	----

MAY.

Sun.	M.	T.	W.	T.	F.	Sat.
----	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	----	----	----

JUNE.

Sun.	M.	T.	W.	T.	F.	Sat.
----	----	----	----	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	----

SEPTEMBER.

Sun.	M.	T.	W.	T.	F.	Sat.
----	----	----	----	----	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

OCTOBER.

Sun.	M.	T.	W.	T.	F.	Sat.
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	----	----	----	----

OFFICERS

OF THE

UNITED STATES NAVAL ACADEMY.

REAR-ADMIRAL C. R. P. RODGERS,

SUPERINTENDENT.

COMMANDER S. D. GREENE,

Senior Aid to the Superintendent.

ACADEMIC STAFF.

COMMANDER F. V. McNAIR,

Commandant of Cadets.

LIEUTENANT-COMMANDER C. W. KENNEDY,

Assistant to the Commandant of Cadets.

SEAMANSHIP, NAVAL TACTICS, AND NAVAL CONSTRUCTION.

COMMANDER N. H. FARQUHAR,

Head of Department.

LIEUTENANT-COMMANDER JOHN SCHOULER,
LIEUTENANT-COMMANDER EDWIN WHITE,
LIEUTENANT HENRY N. MANNEY,
LIEUTENANT E. DE F. HEALD,
LIEUTENANT D. DELEHANTY,

Instructors in Seamanship, Naval Tactics, and Naval Construction.

MATTHEW STROHM,

Instructor in Boxing, Swimming, and Gymnastics.

ORDNANCE AND GUNNERY.

COMMANDER H. B. ROBESON,

Head of Department.

LIEUTENANT-COMMANDER C. M. THOMAS,
LIEUTENANT J. W. MILLER,
LIEUTENANT RICHARD RUSH,
LIEUTENANT T. B. M. MASON,
LIEUTENANT WILLIAM P. POTTER,

Instructors in Naval Gunnery and Infantry Tactics.

ANTOINE J. CORBESIER,

Sword-Master.

JEAN B. RETZ,
GEORGE HEINTZ,

Assistant Sword-Masters.

MATHEMATICS.

PROFESSOR W. W. HENDRICKSON,

Head of Department.

Lieutenant Asa Walker,
Lieutenant C. S. Sperry,
Lieutenant Benjamin F. Tilley,
Lieutenant F. G. Hyde,
Lieutenant H. W. Schaefer,
Master T. B. Howard,

Instructors in Mathematics.

STEAM-ENGINEERING.

——— ———,

Head of Department.

Passed Assistant Engineer W. A. Windsor,
Passed Assistant Engineer J. C. Kafer,
Passed Assistant Engineer R. W. Milligan,
Passed Assistant Engineer J. S. Ogden,
Passed Assistant Engineer A. M. Mattice,
Passed Assistant Engineer G. B. Ransom,
Passed Assistant Engineer A. B. Canaga,

Instructors in Steam-Engineering.

ASTRONOMY, NAVIGATION, AND SURVEYING.

COMMANDER P. F. HARRINGTON,

Head of Department.

Lieutenant-Commander Joseph E. Craig,
Lieutenant J. G. Eaton,
Lieutenant Raymond P. Rodgers,

Instructors in Astronomy, Navigation, and Surveying.

PHYSICS AND CHEMISTRY.

PROFESSOR HENRY D. TODD,

Head of Department.

Lieutenant Charles Belknap,
Lieutenant Edward P. Wood,
Lieutenant J. F. Meigs,
Lieutenant J. B. Murdock,
Professor N. M. Terry, A. M., Ph. D.,
Professor Charles E. Munroe, S. B.,

Instructors in Physics and Chemistry.

MECHANICS AND APPLIED MATHEMATICS.

PROFESSOR J. M. RICE, S. B., Ph. D.,

Head of Department.

Lieutenant-Commander S. H. Baker,
Lieutenant Charles A. Stone,
Lieutenant Alexander McCrackin,
Professor William Woolsey Johnson, A. M.,

Instructors in Mechanics and Applied Mathematics.

ENGLISH STUDIES, HISTORY, AND LAW.

PROFESSOR J. RUSSELL SOLEY, A. B.
Head of Department.

Lieutenant William T. Burwell,
Lieutenant E. D. Taussig,
Lieutenant J. B. Briggs,
Lieutenant N. T. Houston,
Lieutenant M. Fisher Wright,
Professor William W. Fay, A. M.,
Instructors in English Studies, History, and Law.

MODERN LANGUAGES.

PPOFESSOR L. F. PRUD'HOMME, A. M.,
Head of Department.

Lieutenant H. L. Green,
Master John F. Parker,
Assistant Professor A. V. S. Courcelle,
Assistant Professor Eugene Dovilliers,
Assistant Professor Jules Leroux,
Assistant Professor Hippolyte Dalmon,
Instructors in French and Spanish.

Professor Pedro Montaldo,
Instructor in Spanish.

DRAWING.

PROFESSOR MARSHAL OLIVER,
Head of Department.

Ensign James H. Sears,
Assistant Professor C. F. Blauvelt, N. A.,
Instructors in Drawing.

OFFICERS NOT ATTACHED TO THE ACADEMIC STAFF.

LIEUTENANT-COMMANDER FRANCIS A. COOK, *In charge of Practice-Ships.*
MEDICAL INSPECTOR A. C. GORGAS, M. D.
SURGEON WILLIAM A. CORWIN, M. D.
PASSED ASSISTANT SURGEON G. P. LUMSDEN, M. D.
PAY DIRECTOR JAMES D. MURRAY, *Treasurer.*
PAYMASTER L. G. BILLINGS, *Commissary.*
PAYMASTER ROBERT W. ALLEN, *Storekeeper.*
CHAPLAIN J. S. WALLACE, A. M.
ASSISTANT PROFESSOR THOMAS KARNEY, A. M., *Librarian.*
J. J. GRAFF, *Assistant Librarian.*
R. M. CHASE, *Secretary.*

MARINE GARRISON.

CAPTAIN ROBERT W. HUNTINGTON, *Commanding.*
First Lieutenant J. M. T. Young.
First Lieutenant George T. Bates.

Boatswain A. M. Pomeroy.
Gunner Robert Sommers.

MATES.

C. J. Murphy	*Attached to the United States Gunnery-ship Santee and to the sloop-of-war Dale.*
Larkin F. Lee	
William G. Smith	
James Hill	
Robert Silver	*Attached to the United States Steamer Nantucket.*
Benjamin G. Perry	*Attached to the United States Steamer Phlox (steam tender).*
Joseph Rogers	

ACADEMIC BOARD.

Rear-Admiral C. R. P. Rodgers, U. S. N.
Commander F. V. McNair, U. S. N.
Commander N. H. Farquhar, U. S. N.
Commander H. B. Robeson, U. S. N.
Commander P. F. Harrington, U. S. N.
Professor W. W. Hendrickson, U. S. N.
Professor J. M. Rice, Ph. D., U. S. N.
Professor J. R. Soley, A. B., U. S. N.
Professor H. D. Todd, U. S. N.
Professor L. F. Prud'homme, A. M., U. S. N.
Professor Marshal Oliver, U. S. N.

CADET-OFFICERS.

CADET-LIEUTENANT-COMMANDER.

L. NIXON.

CADET-LIEUTENANTS.

S. S. WOOD.
J. G. DOYLE.
W. B. DUNCAN.
J. M. POYER.

CADET-MASTERS.

S. A. W. PATTERSON, *Adjutant.*
J. L. JAYNE.
J. G. McWHORTER.
E. A. ANDERSON.
H. H. KENKEL.

CADET-ENSIGNS.

L. SEMPLE.
W. L. HOWARD.
W. B. FLETCHER.
W. T. PAINE.

CADET-PETTY-OFFICERS.

First Captains of Gun's Crews.

M. Johnston.
W. N. King.
T. C. Prince.
F. A. McNutt.
A. L. Key.
J. J. Blandin.
N. M. Hubbard.
E. W. Sutphen.
W. B. Whittelsey.
H. A. Horst.
L. R. Savage.
L. S. Bennett.
H. H. Eames.
G. E. Kent.
C. Martin.
J. T. Arnold.

Second Captains of Gun's Crews.

F. H. Stahle.
W. R. M. Field.
S. D. Greene, jr.
T. V. Toney.
F. L. Chapin.
B. E. Thurston.
P. N. McGiffin.
L. S. Gwyn.
G. W. Street.
G. C. Stout.
P. H. Philbin.
W. J. Grambs.
H. Fowler.
J. B. Jackson.
R. W. Barkley.
A. S. Keith.

CADET-PASSED-ASSISTANT-ENGINEER.

E. THEISS.

CADET-ASSISTANT-ENGINEERS.

R. W. GATEWOOD.
G. R. FERGUSON.

Cadet-Machinists.

W. H. P. Creighton.
J. H. Fitts.
W. H. Chambers.
O. C. Gsantner.
C. E. Rommell.
A. McAllister.
P. Miller.
W. R. Addicks.

CADET-

Class of 1881

Order of general merit.	Name.	State.	Date of admission.	Age at date of admission.	
				Years.	Months.
*1	**Schock, John Loomis**	Pennsylvania	June 19, 1877	17	4
*2	**Woodward, Joseph Janvier**	At large	June 21, 1877	16	9
*3	**Linnard, Joseph Hamilton**	Pennsylvania	June 21, 1877	16	9
*4	**Hoogewerff, John Adrian**	At large	June 21, 1877	16	7
*5	**Sutton, Francis Eskridge**	New York	June 21, 1877	16	6
*6	**Rees, John Livermore**	Michigan	June 21, 1877	17	4
*7	**Dashiell, Robert Brooke**	At large	June 19, 1877	16	11
8	Rider, Frederic Clinton	Rhode Island	Sept. 12, 1877	17	6
9	White, Harry Kidder	Dakota	Sept. 19, 1877	17	6
10	Karmany, Lincoln	Pennsylvania	Sept. 12, 1877	17	0
11	Capehart, Edward Everett	Ohio	June 22, 1877	17	11
12	Carroll, Eugene	At large	June 19, 1877	16	2
13	Eldredge, Houston	At large	Oct. 2, 1876	15	7
14	Serata, Tasuker	Empire of Japan	Sept. 12, 1877	19	0
15	Bunts, Frank Emory	Ohio	June 20, 1877	16	1
16	Lauchheimer, Charles Henry	Maryland	Sept. 11, 1877	17	11
17	Forshew, Robert Pierpont	New York	June 21, 1876	16	11
18	Stayton, William Henry	Delaware	June 21, 1877	16	3
19	Doyen, Charles Augustus	New Hampshire	June 21, 1876	16	9
20	Mahoney, James Edward	Massachusetts	Sept. 12, 1876	16	9
21	Wilson, Henry Braid	New Jersey	Sept. 11, 1876	15	7
22	Andrews, Horace Burlingame	Michigan	June 22, 1876	15	1
23	Hunicke, Felix Hermann	Missouri	Sept. 11, 1877	17	6
24	Moses, Franklin James	South Carolina	Sept. 11, 1877	16	9
25	Wilkes, Gilbert	Utah	Sept. 12, 1877	14	0
26	Uriu, Sotokichi	Empire of Japan	Sept. 12, 1877	19	0
27	Haines, Henry Cargill	At large	June 26, 1875	15	7
28	Blow, George Preston	Virginia	Sept. 14, 1876	15	11
29	Barnett, George	Wisconsin	June 19, 1877	17	6
30	Perkins, Con Marrast	Georgia	Sept. 11, 1875	14	11
31	Flournoy, William Francis	Louisiana	June 19, 1877	17	9
32	Smies, Frederick William	Ohio	June 22, 1877	16	6
33	Colwell, James Hall	At large	June 20, 1877	16	10
34	Ballentine, Henry Laird	Tennessee	June 20, 1877	16	6
35	Clarke, George	Illinois	June 22, 1877	14	11
36	Robinson, William Moody	At large	June 23, 1876	17	4
37	Buck, Guy Morville	Maine	Sept. 11, 1877	16	10
38	Bryan, Samuel	Maryland	June 14, 1876	17	3
39	Weeks, John Wingate	New Hampshire	June 21, 1877	17	2
40	Harrison, Edward Hanson	At large	June 21, 1877	15	10
41	George, Charles Peaslee	Illinois	July 1, 1876	16	3
42	Weller, Ovington Eugene	Maryland	Sept. 12, 1877	15	7

MIDSHIPMEN.

—72 *members.*

Order of merit in—										Number of demerits.	Sea-service in practice-ships.		Order of general merit.
Seamanship.	Ship-building.	Ordnance and armor.	Marine engines.	Theoretical navigation.	Practical navigation and surveying.	Electricity.	Naval architecture (elective).	Public law.	French and Spanish.		Months.	Days.	
5	4	2	5	1	2	4	1	5	17	15	4	12	*1
4	8	4	1	2	4	3	3	9	29	39	4	12	*2
19	9	5	2	3	1	1	2	8	17	73	4	12	*3
8	11	6	5	7	3	2	4	3	21	75	4	12	*4
23	5	3	4	4	6	8	....	2	1	38	4	12	*5
26	16	12	20	6	10	16	7	6	29	133	4	12	*6
1	2	1	8	24	15	15	....	20	2	20	4	12	*7
57	13	19	9	10	15	5	8	32	34	117	4	12	8
9	6	10	3	11	7	6	6	19	11	32	4	12	9
6	13	8	13	5	5	7	....	12	9	58	4	12	10
16	22	12	7	9	8	10	....	36	4	55	4	12	11
18	20	21	27	14	11	20	....	27	23	103	4	12	12
2	3	14	25	19	25	58	....	16	34	63	4	12	13
46	51	27	65	14	17	14	8	52	63	88	4	12	14
9	38	23	20	32	18	28	....	11	12	30	4	12	15
26	45	27	13	19	13	13	....	10	5	85	4	12	16
28	15	10	10	22	14	21	....	7	23	56	4	12	17
30	69	50	22	12	21	9	5	4	28	155	4	12	18
12	34	19	23	36	39	19	....	15	13	130	4	12	19
31	10	9	11	50	36	16	....	1	9	91	4	12	20
14	31	30	12	13	9	29	....	30	59	78	4	12	21
11	40	37	18	27	24	32	....	28	14	79	4	12	22
20	16	26	32	41	32	66	....	50	3	60	4	12	23
44	39	39	23	14	20	12	....	35	43	105	4	12	24
3	1	21	15	28	32	25	....	30	38	120	4	12	25
23	46	54	55	17	26	30	....	32	54	50	4	12	26
49	11	33	47	36	29	47	....	53	45	141	4	12	27
7	7	7	25	43	42	67	....	20	53	112	4	12	28
15	16	23	32	38	34	22	....	28	70	42	4	12	29
52	19	37	61	55	60	51	....	13	32	103	4	12	30
56	48	48	42	44	30	24	....	22	6	120	4	12	31
61	26	30	45	50	37	57	....	71	41	94	4	12	32
54	31	25	17	24	35	32	....	40	22	89	4	12	33
31	40	42	52	45	42	41	....	16	31	113	4	12	34
31	29	42	27	8	12	26	....	25	62	106	4	12	35
40	34	16	30	30	27	35	....	22	59	88	4	12	36
23	42	30	44	22	18	32	....	38	54	43	4	12	37
16	52	33	36	35	38	47	....	45	45	75	4	12	38
41	34	14	31	38	27	36	....	16	66	87	4	12	39
42	48	60	19	58	42	49	....	70	70	51	4	12	40
31	33	33	47	26	39	39	....	44	38	72	4	12	41
42	56	40	55	18	21	39	....	48	25	114	4	12	42

CADET-

Class of 1881—72

Order of general merit.	Name.	State.	Date of admission.	Age at date of admission.	
				Years.	Months.
43	Cohen, Harry Radcliffe	At large	June 20, 1877	15	4
44	Stewart, Charles West	Illinois	June 21, 1877	17	10
45	Kimball, John Arthur	Massachusetts	Sept. 12, 1877	17	0
46	Crenshaw, James Davis	Texas	Sept. 11, 1877	17	10
47	McJunkin, Ira	Pennsylvania	June 20, 1877	17	4
48	Hains, Robert Peter	Maine	Sept. 18, 1876	16	3
49	Cockle, Rudolphus Rouse	Illinois	June 21, 1875	17	8
50	Kase, Spencer Mettler	Illinois	Sept. 11, 1877	17	10
51	Printup, David Lawrence	New York	June 21, 1877	17	5
52	McCrea, Alexander Sterling	At large	Oct. 2, 1876	17	2
53	Ford, William Griffing	Arkansas	Sept. 11, 1877	15	7
54	Emmet, William Le Roy	At large	June 26, 1876	16	11
55	Craven, Macdonough	New York	June 21, 1876	17	7
56	Rodgers, Guy George	Tennessee	Sept. 23, 1876	14	1
57	Harmon, Eugene Marion	Ohio	June 20, 1877	17	10
58	Donnelly, Michael Joseph	Wisconsin	June 21, 1877	17	7
59	Dresser, James Walter	Minnesota	June 21, 1877	16	8
60	Wright, Silas Haynes	Michigan	June 28, 1876	17	10
61	Craig, Ben Holliday	Missouri	June 14, 1876	16	8
62	Matthews, Thomas Henry	Pennsylvania	Sept. 12, 1876	16	1
63	Williamson, Samuel Hill	North Carolina	Sept. 11, 1876	17	10
64	Bonfils, Thomas Lewis	Missouri	June 19, 1875	17	8
65	Oliphant, Alexander Coulter	New Jersey	Sept. 12, 1877	17	5
66	Vance, Zebulon Baird	North Carolina	June 22, 1876	16	0
67	McKee, Llewelyn Thomas	Pennsylvania	June 20, 1877	17	0
68	Morgan, Daniel	Kentucky	Sept. 11, 1877	17	10
69	Parsons, Arthur Carlton	Iowa	June 21, 1876	17	11
70	Perry, George Ernest	Illinois	Sept. 12, 1876	16	10
71	Hasson, Alexander Ritchie	At large	June 21, 1875	15	4
72	Enouye, Yonoske	Empire of Japan	Sept. 18, 1877	19	0

MIDSHIPMEN.

members—Continued.

Order of merit in—										Number of demerits.	Sea-service in practice-ships.		Order of general merit.
Seamanship.	Ship-building.	Ordnance and armor.	Marine engines.	Theoretical navigation.	Practical navigation and surveying.	Electricity.	Naval architecture (elective).	Public law.	French and Spanish.		Months.	Days.	
21	20	17	39	60	49	61	....	14	26	46	4	12	43
50	62	52	37	31	23	37	....	41	14	107	4	12	44
31	44	61	54	34	49	38	....	64	47	134	4	12	45
47	23	45	16	32	69	26	....	61	14	72	4	12	46
21	27	27	50	45	64	41	....	32	33	30	4	12	47
52	30	33	32	56	56	70	....	48	49	119	4	12	48
28	24	51	46	47	51	61	....	41	50	146	4	12	49
38	58	56	64	49	64	22	....	41	36	83	4	12	50
58	46	44	42	29	51	41	....	46	41	152	4	12	51
60	48	49	59	61	58	44	....	38	17	137	4	12	52
36	54	18	55	53	41	54	....	57	57	121	4	12	53
54	27	58	39	64	60	18	....	73	75	177	4	12	54
13	42	59	35	72	66	60	....	63	40	138	4	12	55
48	62	62	51	58	53	67	....	26	26	142	4	12	56
36	64	47	65	40	47	67	....	55	50	136	4	12	57
64	24	46	41	42	53	31	....	50	17	114	4	12	58
51	53	55	38	47	45	46	....	55	64	171	4	12	59
66	60	53	47	50	67	50	....	60	61	125	4	12	60
44	65	66	52	62	58	44	....	36	52	105	4	12	61
63	66	75	65	70	71	54	....	66	47	156	4	12	62
69	72	70	58	67	67	58	....	53	44	145	4	12	63
65	70	71	72	53	48	70	....	66	72	131	4	12	64
74	66	63	69	64	71	72	....	46	58	48	4	12	65
72	58	73	70	64	62	56	....	72	66	183	5	0	66
71	55	64	59	57	56	53	....	57	69	112	4	28	67
62	66	64	65	67	62	73	....	68	74	132	4	12	68
67	71	56	71	69	53	65	....	59	65	102	4	12	69
67	74	72	72	71	70	64	....	64	56	158	5	0	70
39	37	41	29	21	31	11	....	22	36	113	7	15	71
76	*a*	76	*a*	*a*	*a*	*a*	....	76	*a*	11	2	16	73

CADET-

First class—

Order of annual merit.	Name.	State.	Date of admission.	Age at date of admission.	
				Years.	Months.
16	Anderson, Edwin Alexander	North Carolina	June 21, 1878	17	11
3	Arnold, John Thompson	Wyoming Ter	Sept. 27, 1877	17	10
6	Bennett, Louis Slocum	New Jersey	Sept. 11, 1877	15	9
13	Blandin, John Joseph	Alabama	June 21, 1878	15	10
11	Doyle, James Gregory	Pennsylvania	June 21, 1877	17	1
17	Duncan, William Buttler	New York	Nov. 1, 1878	16	6
34	Eames, Harold Hayden	Maine	June 21, 1878	14	6
15	Field, Wiley Roy Mason	Virginia	June 21, 1878	15	8
4	Fletcher, William Bartlett	Vermont	Sept. 11, 1877	15	8
32	Fowler, Hammond	Virginia	Sept. 23, 1878	16	7
26	Grambs, William Jacob	Pennsylvania	Sept. 11, 1877	15	5
23	Gwyn, Lawrence Sangston	Mississippi	June 21, 1878	16	11
24	Horst, Henry August	Alabama	June 21, 1878	17	5
19	Howard, William Lauriston	Connecticut	Sept. 11, 1877	17	8
28	Hubbard, Nathaniel Mead	At large	Sept. 11, 1877	17	6
9	Jayne, Joseph Lee	Mississippi	June 21, 1878	15	1
7	Johnston, Marbury	Georgia	Sept. 23, 1878	17	9
27	Kenkel, Herman Henry	Minnesota	June 21, 1878	17	5
36	Kent, George Edward	New York	June 21, 1877	16	10
18	Key, Albert Lenoir	Tennessee	June 21, 1877	16	11
33	King, William Nephew, jr	Georgia	June 21, 1875	17	5
30	Martin, Clarence	Louisiana	June 21, 1878	16	3
25	McGiffin, Philo Norton	Pennsylvania	Sept. 11, 1877	16	9
35	McNutt, Finley Alexander	Indiana	Sept. 11, 1877	16	9
10	McWhorter, Jacob Gray	Georgia	Sept. 12, 1877	16	2
*1	**Nixon, Lewis**	Virginia	June 21, 1878	17	2
21	Payne, Walter Taylor	Ohio	Sept. 11, 1877	14	11
†	Parker, Felton	Iowa	Nov. 6, 1876	16	0
29	Patterson, Samuel Achmuty Wainwright.	At large	June 21, 1876	16	6
22	Poyer, John Martin	At large	June 21, 1877	15	9
12	Prince, Thomas Clayton	Ohio	June 21, 1878	17	9
14	Savage, Ledru Rollin	Illinois	Sept. 23, 1878	17	2
20	Semple, Lorenzo	Alabama	Sept. 11, 1877	16	0
31	Stahle, Frederick Henry	California	Sept. 11, 1877	15	4
5	Sutphen, Edson Webster	Nebraska	June 21, 1878	17	9
8	Whittelsey, William Bailey	New York	June 21, 1878	17	11
*2	**Wood, Spencer Shepard**	New York	June 21, 1878	16	10

† Turned back from the class of 1881.

MIDSHIPMEN.

37 members.

Order of merit in—										Sea-service in practice-ships.		
Seamanship.	Naval tactics.	Ordnance instructions and infantry tactics.	Astronomy.	Physics and chemistry.	Light and heat.	Mechanics and calculus.	English and history.	French.	Number of demerits.	Months.	Days.	Order of annual merit.
16	28	12	12	14	14	24	23	21	123	6	26	16
5	9	31	7	5	3	2	9	31	177	6	26	3
19	6	11	9	7	4	10	2	1	124	6	26	6
18	16	16	25	11	8	22	6	3	161	6	26	13
10	14	5	6	8	17	14	32	32	151	6	26	11
4	3	10	34	36	29	25	32	9	188	6	26	17
7	17	14	34	5	34	29	35	27	228	6	26	34
12	13	25	16	19	28	13	28	8	195	6	26	15
2	7	4	2	2	6	5	5	17	88	6	26	4
37	21	38	30	32	25	31	19	24	188	6	26	32
28	27	31	19	26	20	21	14	30	164	6	26	26
35	11	37	15	25	18	15	10	17	169	6	26	23
30	21	30	34	16	31	27	4	2	159	6	26	24
15	24	22	17	31	21	28	27	5	108	6	26	19
12	26	33	27	17	29	31	23	35	187	6	26	28
9	18	15	2	17	9	6	17	32	175	6	26	9
22	8	18	11	8	11	4	7	12	141	6	26	7
24	19	20	31	22	26	23	17	32	174	6	26	27
34	29	28	25	33	35	31	30	37	157	6	26	36
25	21	19	22	19	16	11	16	22	198	6	26	18
19	19	20	23	19	36	26	22	11	191	4	10	33
36	38	29	32	30	22	31	31	10	157	6	26	30
14	35	5	28	22	27	35	23	28	180	6	26	25
33	37	25	20	4	19	18	38	19	189	6	26	35
10	3	8	14	15	7	8	28	25	158	6	26	10
8	1	3	1	1	1	1	1	6	162	6	26	*1
32	36	34	23	28	23	8	36	7	81	6	26	21
....	....	....	....	....	....	....	....	....	....	4	12	†
21	10	9	32	33	23	29	34	35	150	6	26	29
22	32	27	21	27	14	20	19	22	171	6	26	22
17	25	13	10	22	13	19	7	15	35	6	26	12
26	30	17	13	11	5	16	14	20	86	6	26	14
27	15	23	17	28	31	17	13	3	158	6	26	20
31	33	23	28	35	31	36	37	14	155	6	26	31
1	12	7	5	3	12	7	3	26	78	6	26	5
6	5	2	8	13	9	12	26	29	76	6	26	8
3	2	1	4	10	2	3	12	13	56	6	26	*2

Second class—

Order of annual merit.	Name.	State.	Date of admission.	Age at date of admission.	
				Years.	Months.
16	Agee, Alfred Pelham	Alabama	June 11, 1879	16	10
13	Alexander, Robert Colder	Kentucky	Sept. 22, 1879	16	2
24	Balthis, Harry Hamilton	Illinois	June 11, 1879	17	8
6	Barkley, Richard Warren	Missouri	June 19, 1875	16	3
18	Barnard, John Hall	New York	Sept. 23, 1878	17	2
*3	**Bowman, William Ezekiel**	Michigan	Sept. 22, 1879	16	3
14	Brady, Cyrus Townsend	Kansas	Sept. 22, 1879	17	9
12	Chapin, Frederick Lincoln	Illinois	Sept. 22, 1879	16	3
28	Colvin, Frank Reginald	New York	Sept. 22, 1879	17	2
26	Dalrymple, Elton Wesley	Iowa	June 21, 1878	16	4
37	Dovalé, Arthur	New York	Sept. 23, 1878	17	10
11	Frazier, Robert Thomas	Tennessee	Sept. 23, 1879	16	4
8	George, Harry	Michigan	June 11, 1879	16	1
19	Gignilliat, Thomas Heywood	Georgia	Sept. 23, 1878	15	7
34	Gray, Willie Theodore	North Carolina	May 8, 1878	18	0
*1	**Greene, Samuel Dana, jr**	Rhode Island	June 18, 1879	14	7
20	Jackson, John Alexander	Florida	Sept. 22, 1879	17	11
*5	**Jackson, John Brinckerhoff**	New Jersey	Sept. 22, 1879	17	1
10	Keith, Albion Sherman	Massachusetts	Sept. 22, 1879	16	5
32	Ledbetter, William Hamilton	Texas	Sept. 22, 1879	17	8
36	Legaré, Alexander Brown	South Carolina	Mar. 20, 1878	18	0
21	Lerch, Robert Lee	Ohio	Sept. 22, 1879	16	3
15	Megrath, William Alonzo	Georgia	Sept. 22, 1879	17	4
30	Mitchell, Sidney Zollicoffer	Alabama	Sept. 23, 1878	16	6
29	O'Leary, Timothy Stephen	Massachusetts	Sept. 22, 1879	18	0
35	Pettit, Harry Corbin	Indiana	Sept. 22, 1879	15	10
25	Philbin, Patrick Henry	Maryland	June 21, 1878	17	8
9	Schrader, George Morrison von	Missouri	Sept. 23, 1878	16	5
39	Smith, Thomas Buchanan	Alabama	June 21, 1878	17	8
17	Stout, George Clymer	Pennsylvania	Sept. 22, 1879	17	2
*2	**Street, George Washington**	Wisconsin	Sept. 22, 1879	16	7
*4	**Sweeting, Charles Edward**	New York	Sept. 22, 1879	17	11
7	Thurston, Benjamin Eaton	Indiana	Sept. 22, 1879	15	5
27	Toney, Tremlet Vivian	Illinois	June 11, 1879	17	8
31	Weeks, Edwin Babbitt	Oregon	Sept. 23, 1878	15	3
33	Wilson, William Joseph	Ohio	Sept. 22, 1879	17	11
23	Witherspoon, Thomas Alfred	Tennessee	June 11, 1879	17	2
22	Woods, Robert Harris	Virginia	Sept. 23, 1878	17	10

MIDSHIPMEN.

38 *members.*

Order of merit in—								Number of demerits.	Sea-service in practice-ships.		Order of annual merit.
Seamanship.	Trigonometry.	Analytical geometry.	Descriptive geometry.	Physics.	History and rhetoric.	French.	Drawing.		Months.	Days.	
28	13	14	15	25	13	20	45	184	4	29	16
16	22	17	11	9	17	21	12	65	4	29	13
23	26	37	29	11	15	28	22	114	4	29	24
9	8	9	4	16	3	11	1	74	2	17	6
8	15	34	20	9	25	29	2	186	4	29	18
3	5	3	5	15	2	7	7	146	4	29	*3
19	18	18	21	29	10	9	5	183	4	29	14
7	18	18	13	19	6	13	26	115	4	29	12
33	30	27	24	22	19	22	47	153	4	29	28
34	15	22	32	29	22	19	31	238	4	29	26
27	45	29	33	39	41	30	19	166	4	29	37
34	12	11	14	21	11	10	23	103	4	29	11
6	11	6	8	4	7	33	16	170	4	29	8
29	18	12	12	23	31	36	4	180	4	29	19
34	44	33	37	36	36	40	40	118	4	29	34
1	2	2	2	2	1	1	9	79	4	29	*1
18	17	20	25	17	23	14	29	231	4	29	20
12	4	5	7	3	9	4	14	65	4	29	*5
24	22	10	10	12	17	12	3	124	4	29	10
37	32	38	40	33	40	39	41	160	4	29	32
26	26	40	36	41	42	35	26	177	4	29	36
24	39	23	27	12	14	3	10	174	4	29	21
15	10	15	15	20	38	32	13	173	4	29	15
17	33	24	37	36	36	16	43	208	4	29	30
20	38	31	33	24	29	16	10	107	4	29	29
42	18	28	41	29	20	31	18	119	4	29	35
22	37	16	27	27	28	15	36	140	4	29	25
11	6	12	18	17	12	34	8	168	2	17	9
29	39	41	42	38	29	41	44	247	4	29	39
4	35	21	17	8	21	24	20	211	4	29	17
5	1	1	1	1	5	1	26	127	4	29	*2
13	3	4	3	6	7	5	15	263	4	29	*4
10	9	7	6	7	16	6	5	104	4	29	7
2	35	43	22	29	25	23	33	134	4	29	27
39	33	25	26	28	34	26	37	219	4	29	31
40	41	31	37	35	35	41	42	116	4	29	33
13	26	35	23	12	24	25	30	133	4	29	23
20	30	29	19	26	32	7	34	80	4	29	22

CADET-

Third class—

Order of annual merit.	Name.	State.	Date of admission.
33	Barker, William Alfred	Colorado	Sept. 22, 1880
6	Beecher, Albert Morrison	Iowa	June 11, 1880
37	Bush, William Wirt, jr	New York	Sept. 22, 1880
29	Carter, Vaulx	Pennsylvania	Sept. 22, 1880
13	Cook, William Ellsworth	Ohio	Sept. 30, 1880
*1	**Curtis, Frederic Ellsworth**	Massachusetts	Sept. 22, 1880
22	Friedlander, Harry	California	Sept. 22, 1880
24	Harrell, John Randolph	Louisiana	Sept. 22, 1880
17	Hayes, Charles Harold	Pennsylvania	Sept. 22, 1880
25	Hazeltine, Charles Walter	Missouri	June 11, 1880
†	Hepp, Charles Frederick	Missouri	June 21, 1878
12	Hoggatt, Wilford Bacon	Indiana	June 11, 1880
23	Jastremski, Leon Henry	Louisiana	Sept. 22, 1879
21	Johnston, William	Mississippi	June 11, 1880
9	Jones, Hilary Pollard, jr	Virginia	Sept. 22, 1880
11	Leary, Thomas Horton	North Carolina	Sept. 22, 1880
27	Macpherson, Victor	Kentucky	Sept. 22, 1880
28	Maxcy, John Wharton	Texas	June 11, 1880
31	McCook, John Anson	New York	Sept. 30, 1880
35	McCord, Harry Herrick	New York	June 11, 1880
15	McCreary, Wirt	Pennsylvania	June 11, 1879
20	McDonald, John Daniel	Nevada	Oct. 6, 1880
18	McIntire, Alonza Evans	Massachusetts	Sept. 22, 1879
5	McKean, Josiah Slutts	Ohio	Sept. 22, 1879
4	McNulta, Herbert	Illinois	June 11, 1880
*2	**Moseley, Nathaniel Stockwell**	California	Mar. 22, 1880
26	O'Malley, William Ambrose	Pennsylvania	Sept. 22, 1880
3	Plunkett, Charles Peshall	District of Columbia	Sept. 30, 1879
14	Seymour, Isaac Knight	Maine	Sept. 22, 1880
10	Shoemaker, William Rawle	New Mexico	June 11, 1880
19	Smith, Sidney Fuller	Massachusetts	Sept. 22, 1880
36	Sparling, Frederick Herbert	Washington Territory	Dec. 29, 1879
32	Stevens, Raymond Rodgers Watmough Bliss	Kentucky	Nov. 18, 1879
16	Terrell, Douglass Fuqua	Mississippi	Sept. 22, 1880
8	Welles, Roger, jr	Connecticut	Sept. 22, 1880
7	Williams, Clarence Stewart	Ohio	Sept. 22, 1880
34	Williams, William Plumb	Connecticut	June 11, 1880
30	Wirt, William Edgar	Ohio	Sept. 22, 1880

† Absent (sick).

MIDSHIPMEN.

38 *members.*

Age at date of admission.		Order of merit in—					Number of demerits.	Sea-service in practice-ships.		Order of annual merit.
Years.	Months.	Seamanship.	Mathematics.	English and history.	French.	Drawing.		Months.	Days.	
16	6	43	35	30	42	20	111	2	17	33
17	4	2	4	14	36	2	151	4	10	6
15	8	44	36	32	46	36	156	2	17	37
17	1	15	31	39	22	1	109	2	17	29
18	0	46	11	8	13	19	110	2	17	13
17	8	9	5	1	4	7	52	2	17	*1
17	11	45	10	29	8	39	209	2	17	22
16	7	19	26	24	19	9	142	2	17	24
16	8	20	24	20	30	4	38	2	17	17
17	2	25	28	11	29	34	161	4	10	25
17	2	....	....	....	....	....	....	2	12	†
14	9	4	12	12	34	43	55	4	10	12
14	11	29	12	41	3	27	254	4	10	23
17	10	10	20	36	1	23	160	4	10	21
16	10	22	14	16	2	27	81	2	17	9
16	11	18	9	21	26	30	61	2	17	11
15	3	28	24	25	40	44	181	2	17	27
16	5	34	21	26	28	47	209	4	10	28
17	2	14	29	31	41	22	223	2	17	31
15	5	33	38	36	31	24	316	4	10	35
17	1	7	22	5	27	17	256	2	17	15
16	11	35	16	21	15	42	67	2	17	20
15	0	25	22	18	10	10	298	4	10	18
15	3	7	2	8	5	16	292	2	17	5
17	6	5	7	4	22	12	125	4	10	4
18	0	1	3	2	13	6	256	4	10	*2
17	4	31	19	34	36	20	96	2	17	26
15	7	5	1	19	17	10	296	2	17	3
17	6	23	17	12	6	31	27	2	17	14
17	4	3	18	7	21	2	190	4	10	10
16	11	17	31	8	10	13	38	2	17	19
18	0	11	38	41	38	33	287	4	10	36
18	0	39	37	23	7	40	289	4	10	32
17	3	21	15	6	22	41	111	2	17	16
17	9	13	8	16	17	5	55	2	17	8
16	11	35	6	3	10	32	65	2	17	7
17	11	38	38	43	35	18	79	4	10	34
17	9	29	27	35	32	24	84	2	17	30

CADET-MIDSHIPMEN.

Fourth class—48 members.

Name.	State.	Date of admission.	Age at date of admission.		Sea-service in practice-ships.	
			Years.	Months.	Months.	Days.
Atwood, John Cowan	Missouri	June 11, 1880	17	0	4	10
Blake, Henry Davis	North Carolina	Sept. 20, 1880	18	0	0	0
Burnstine, Albert	Michigan	Sept. 22, 1881	17	0	0	0
Clark, Horry Dent	Georgia	June 11, 1881	16	8	2	17
Coontz, Robert Edward	Missouri	Sept. 22, 1881	17	3	0	0
Corpening, Charles Macon	North Carolina	June 11, 1881	16	5	2	17
Crisfield, James Alfred Pearce	Maryland	Feb. 1, 1881	16	2	2	17
Davis, James Sherlock	Ohio	June 11, 1880	17	9	4	10
De Krafft, John Charles Philip	Iowa	Feb. 28, 1881	16	9	2	17
Dutton, Arthur Henry	Indiana	Sept. 21, 1881	17	1	0	0
Eberle, Edward Walter	Arkansas	Sept. 22, 1881	17	0	0	0
Edgar, Webster Appleton	New York	Sept. 22, 1881	17	5	0	0
Ferriss, Louis Duane	New York	Sept. 21, 1881	17	3	0	0
Gibson, Robert Ewing Lee	Missouri	June 11, 1881	17	5	2	17
Gilmer, William Wirt	Virginia	June 11, 1880	17	0	4	10
Howell, Robert Beecher	Michigan	Sept. 21, 1881	17	8	0	0
Jacobs, Benjamin	Kansas	June 11, 1881	16	9	2	17
Kittrell, James Wesson	Mississippi	Sept. 23, 1881	17	6	0	0
Lamison, Jason Gordon	Ohio	June 11, 1880	16	5	4	10
Ledbetter, Thomas Pryor	Alabama	Sept. 21, 1881	15	2	0	0
Livingood, James Jameson	Pennsylvania	Sept. 22, 1881	15	7	0	0
Lombard, Benjamin Matthew	Iowa	Sept. 21, 1881	14	9	0	0
Luzenberg, Charles Kennard	Illinois	Sept. 21, 1881	16	2	0	0
McGuinness, John Patrick	Idaho Territory	Sept. 21, 1881	17	0	0	0
Nes, David Small	Pennsylvania	June 13, 1881	15	11	2	17
Pagin, James Richard	Indiana	Sept. 21, 1881	17	4	0	0
Pentz, George Shannon	New York	Oct. 14, 1881	18	0	0	0
Pitner, Samuel Ellis	Tennessee	Sept. 22, 1881	17	3	0	0
Poe, Charles Carroll	Pennsylvania	Sept. 21, 1881	17	9	0	0
Raichle, Frank Godfrey	New York	June 11, 1880	16	11	4	10
Robinson, Leonidas Leicester	Ohio	Sept. 22, 1881	17	10	0	0
Russell, Robert Lee	Georgia	June 14, 1881	16	7	2	17
Sargent, Frederic Homer	Illinois	June 11, 1880	17	6	4	10
Scott, William Sanders	Pennsylvania	June 11, 1881	16	2	2	17
Shindell, James Elliott	Pennsylvania	June 13, 1881	17	8	2	17
Shipley, Richard Trenton	Missouri	Feb. 3, 1881	16	2	2	17
Slade, Thomas Bog	Georgia	June 11, 1881	17	11	2	17
Sloan, Albert Brown	Missouri	Sept. 22, 1880	17	8	2	17
Slocum, George Ralph	Illinois	Sept. 22, 1881	17	0	0	0
Stearns, John Warren	New Hampshire	Sept. 21, 1881	15	3	0	0
Tarbox, Glennie	South Carolina	Sept. 22, 1881	17	7	0	0
Tennant, George Boyce	Michigan	Sept. 22, 1881	17	9	0	0
Thompson, Alexander	New York	Sept. 23, 1881	17	0	0	0
Tilden, Edward Woodruff	Ohio	June 13, 1881	17	11	2	17
Treadway, Henry Blake	Illinois	Feb. 3, 1881	16	1	2	17

CADET-MIDSHIPMEN.

Fourth class—48 *members*—Continued.

Name.	State.	Date of admission.	Age at date of admission.		Sea-service in practice-ships.	
			Years.	Months.	Months.	Days.
Van Keuren, Jerome	New York	June 11, 1881	16	6	2	17
Wood, John Whitaker	North Carolina	Sept. 22, 1880	16	11	2	17
Wright, Benjamin	Tennessee	Sept. 21, 1881	16	2	0	0

CADET-

Graduating class of

Order of general merit.	Name.	State.	Date of admission.	Age at date of admission.	
				Years.	Months.
1	Whitham, Jay Manuel	Illinois	Sept. 13, 1877	19	0
2	Kaemmerling, Gustave	Indiana	Sept. 13, 1877	19	3
3	Shallenberger, Oliver Blackburn	Pennsylvania	Sept. 13, 1877	17	4
4	Byrne, James Edwin	Massachusetts	Sept. 14, 1876	19	5
5	Dowst, Frank Butland	Massachusetts	Sept. 13, 1877	18	3
6	McAlpine, Kenneth	Virginia	Sept. 13, 1877	17	0
7	Smith, William Stuart	New York	Sept. 13, 1877	19	8
8	Webster, William Townsend	New York	Sept. 13, 1877	20	1
9	Bankson, Lloyd	Pennsylvania	Sept. 13, 1877	19	9
10	Mathews, Clarence Herbert	Ohio	Sept. 14, 1876	19	7
11	Redgrave, De Witt Clinton	Maryland	Sept. 13, 1877	19	2
12	Stewart, Robert, jr	Michigan	Sept. 13, 1877	19	5
13	Parsons, Isaac Brown	Michigan	Sept. 13, 1877	17	8
14	White, William Wilmot	Pennsylvania	Sept. 13, 1877	17	11
15	Sampson, Bias Clay	Illinois	Sept. 13, 1877	19	6
16	Perkins, Lyman Burnham	Connecticut	Sept. 13, 1877	18	7
17	Belden, Charles Emery	Ohio	Sept. 14, 1876	18	6
18	Arnold, Solon	Maryland	Sept. 14, 1876	22	2
19	Bush, Arthur Richmond	Massachusetts	Sept. 13, 1877	17	4
20	Anderson, Martin Augustus	Wisconsin	Sept. 13, 1877	19	11
21	Hogan, Thomas Joseph	Georgia	Oct. 1, 1874	18	10
22	Gartley, William Henry	Pennsylvania	Sept. 13, 1877	18	1
23	Moritz, Albert	New York	Sept. 13, 1877	17	2
24	Beach, Robert James	New York	Sept. 13, 1877	19	10

ENGINEERS.

1881—24 *members.*

Order of merit in—										Number of demerits.	Sea-service in practice-ships.		Order of general merit.
	Steam-engineering.			Electricity.	Physical measurements.	Applied mechanics.	Naval architecture and method of least squares.	Naval architecture (elective).	French and Spanish.				
S	Mechanical drawing and fabrication.	Designing machinery and marine engines.	Boilers.								Months.	Days.	
1	3	1	1	2	3	1	1	1	18	54	5	15	1
15	7	3	4	5	3	2	2	2	4	90	5	15	2
5	1	10	2	4	1	14	13	......	9	128	5	15	3
8	5	9	10	3	10	5	4	3	6	132	5	8	4
7	10	2	5	9	17	10	10	8	5	131	5	8	5
8	12	11	16	8	5	6	3	5	1	173	5	15	6
13	8	4	3	1	2	11	6	7	21	88	8	2	7
3	2	7	5	14	15	16	9	......	15	104	5	8	8
2	14	12	8	11	10	12	18	......	17	81	5	15	9
5	15	4	13	6	19	3	5	5	6	89	5	4	10
22	12	17	11	16	10	13	12	10	16	104	8	2	11
18	20	19	18	12	10	15	7	10	8	68	5	0	12
11	4	15	9	22	5	16	19	......	23	158	5	15	13
15	15	8	15	9	22	6	11	9	23	128	5	15	14
21	18	16	20	19	22	4	8	3	20	121	5	15	15
12	6	4	7	18	19	19	13	......	11	148	5	8	16
20	21	13	16	7	10	9	17	12	10	47	5	3	17
10	23	20	14	14	18	8	16	12	3	102	8	2	18
4	9	13	21	16	5	21	15	......	25	160	5	8	19
15	11	17	12	20	15	22	21	......	13	151	5	15	20
19	17	23	19	13	22	22	20	......	14	173	5	6	21
14	22	22	22	23	5	16	24	......	22	153	5	15	22
24	24	21	23	21	5	22	21	......	12	147	5	8	23
25	25	24	24	24	21	22	21	......	19	152	5	8	24

CADET-

First class—

Order of annual merit.	Name.	State.	Date of admission.	Age at date of admission.	
				Years.	Months.
19	Addicks, Walter Robarts	Pennsylvania	Oct. 1, 1878	17	5
7	Chambers, William Henry	Pennsylvania	Oct. 1, 1878	19	11
10	Clarke, Arthur Henry	Rhode Island	Oct. 1, 1878	18	1
22	Coley, Frederick Edward	New York	Oct. 1, 1878	16	8
11	Conant, Frank Henry	Massachusetts	Oct. 1, 1878	19	5
*3	**Creighton, William Henry Paul**	Ohio	Oct. 1, 1878	19	2
17	Day, Willis Bunner	Ohio	Sept. 13, 1877	19	10
*4	**Ferguson, George Robert**	Connecticut	Oct. 1, 1878	19	3
6	Fitts, James Henry	Virginia	Oct. 1, 1878	17	7
*2	**Gatewood, Robert Woodland**	Virginia	Oct. 1, 1878	16	9
9	Gsantner, Otto Charles	New Jersey	Oct. 1, 1878	19	0
16	Hawthorne, Harry Leroy	Kentucky	Oct. 1, 1878	19	9
15	Higgins, Robert Barnard	Maryland	Oct. 1, 1878	20	0
20	Howland, Charles Henry	Rhode Island	Oct. 1, 1878	17	5
13	Leonard, John Calvin	Ohio	Oct. 1, 1878	19	3
23	Leopold, Harry Girard	Ohio	Oct. 1, 1878	19	6
18	McAllister, Andrew	New York	Sept. 13, 1877	19	3
*5	**Miller, Peter**	Kansas	Oct. 1, 1878	18	7
12	Pendleton, Joseph Henry	Pennsylvania	Oct. 1, 1878	18	3
8	Rommell, Charles Edward	Pennsylvania	Oct. 1, 1878	16	2
*1	**Theiss, Emil**	Wisconsin	Oct. 1, 1878	17	11
14	Willis, Clarence Calhoun	Mississippi	Oct. 1, 1878	19	0
21	Winchell, Ward Philo	Ohio	Oct. 1, 1878	19	5

ENGINEERS.

23 *members.*

Order of merit in—										Sea-service in practice-ships.		
Mechanical drawing.	Fabrication of machinery.	Designing of machinery.	Astronomy.	Physics and chemistry.	Heat and light.	Mechanics and calculus.	English and history.	French.	Number of demerits.	Months.	Days.	Order of annual merit.
13	14	14	14	22	15	21	7	23	166	7	18	19
3	9	5	9	9	5	7	2	8	81	7	18	7
21	25	15	7	16	9	9	5	5	109	7	18	10
19	23	18	18	24	20	22	20	21	219	7	18	22
17	5	13	13	11	13	20	15	12	165	7	18	11
4	6	3	6	3	3	5	1	4	71	7	18	*3
15	4	12	19	18	22	19	10	18	87	8	2	17
1	3	6	5	6	7	4	16	6	42	7	18	*4
6	16	7	3	5	6	6	7	2	143	7	18	6
2	15	1	8	2	2	1	4	3	181	7	18	*2
11	1	9	15	7	10	11	17	7	100	7	18	9
7	16	20	12	13	17	15	18	19	151	7	18	16
8	7	23	16	8	10	17	23	15	124	7	18	15
18	24	19	20	23	20	18	12	17	180	7	18	20
23	20	16	3	16	12	16	14	14	122	7	18	13
20	8	8	23	14	17	10	25	24	204	7	18	23
15	16	21	22	14	24	14	7	20	112	7	18	18
10	12	3	2	4	4	3	6	10	146	7	18	*5
25	13	11	17	10	16	12	18	13	184	7	18	12
8	19	9	10	12	8	8	10	11	87	7	18	8
5	2	2	1	1	1	2	2	1	168	7	18	*1
22	11	22	11	19	14	12	13	8	196	7	18	14
12	9	16	21	20	23	23	23	16	193	7	18	21

CADET-

Second class —

Order of annual merit.	Name.	State.	Date of admission.
*5	**Aldrich, William Sleeper**	New Jersey	October 1, 1879
*1	**Armistead, Samuel Wilson**	Virginia	October 1, 1879
12	Barnes, Charles Edwin	New Jersey	October 1, 1879
*2	**Baxter, William Joseph**	Ohio	October 1, 1879
19	Carswell, William Beggs	Delaware	October 1, 1879
10	Darrah, William Francis	Rhode Island	October 1, 1879
25	Duvall, Marius, jr	Maryland	October 1, 1879
8	Dyson, Charles Wilson	Pennsylvania	October 1, 1879
*3	**Eaton, Charles Phillips**	Wisconsin	October 1, 1879
21	Ellenger, Julius	Maryland	October 1, 1879
*6	**Ellicott, John Morris**	Maryland	October 1, 1879
13	Field, Harry Ashby	Virginia	October 1, 1879
16	Gillis, Harry Alexander	Pennsylvania	October 1, 1879
24	Glascock, Eustace Straughn	Maryland	October 1, 1879
14	Gross, Charles Jacob	Maryland	October 1, 1879
11	Halstead, Alexander Seaman	Pennsylvania	October 1, 1879
17	Herbert, William Cromwell	Pennsylvania	October 1, 1879
22	Lawrance, William Hunter	Pennsylvania	October 1, 1879
*7	**Littlehales, George Washington**	Pennsylvania	October 1, 1879
20	Palmer, James Edward	North Carolina	October 1, 1879
15	Quinby, Isaac Henry	New York	October 1, 1878
23	Ryan, Philip Joseph	New York	October 1, 1879
†	Shock, Thomas Alexander Wharton	Maryland	October 1, 1878
18	Webster, Charles Franklin	Pennsylvania	October 1, 1879
*4	**Woodruff, Charles Edward**	Pennsylvania	October 1, 1879
	Zinnell, George Frederick	Pennsylvania	October 1, 1879

† Turned back from

ENGINEERS.

26 *members.*

Age at date of admission.		Order of merit in—					Number of demerits.	Sea-service in practice-ships.		Order of annual merit.
Years.	Months.	Mathematics.	Mechanical drawing and fabrication of machinery.	Elementary physics.	History and rhetoric.	French.		Months.	Days.	
16	6	5	1	2	11	15	52	4	0	*5
18	0	1	2	6	3	8	61	4	0	*1
17	8	14	9	12	8	11	169	4	0	12
20	11	2	6	2	1	4	66	4	0	*2
18	10	17	17	23	14	22	159	4	0	19
17	1	10	8	5	6	3	153	3	17	10
20	3	23	20	25	24	24	249	4	0	25
17	9	6	18	8	9	9	149	4	0	8
16	4	3	10	7	10	1	95	4	0	*3
16	11	21	21	14	17	20	195	4	0	21
20	0	6	3	11	4	6	71	4	0	*6
17	2	12	10	19	15	17	21	4	0	13
17	9	19	12	24	13	18	187	4	0	16
16	6	25	25	22	21	21	248	4	0	24
17	11	13	5	21	16	9	89	4	0	14
17	9	11	19	9	11	13	144	4	0	11
15	6	15	23	17	17	16	228	4	0	17
20	11	22	13	17	22	24	131	4	0	22
18	11	9	14	4	2	5	40	4	0	*7
18	3	19	7	16	25	23	67	4	0	20
17	7	16	15	13	20	2	249	6	16	15
19	11	24	24	20	23	19	225	4	0	23
18	4	....	....	....	....	....	....	5	1	†
17	8	17	22	15	17	13	232	4	0	18
18	11	4	4	1	5	7	147	4	0	*4
17	11	8	16	10	7	12	108	4	0	9

the present first class.

CADET-ENGINEERS.

Third class—26 members.

Order of annual merit.	Name.	State.	Date of admission.	Age at date of admission.		Order of merit in—				Number of demerits.	Sea-service in practice-ships.	
				Years.	Months.	Mathematics.	Mechanical drawing.	English and history.	French.		Months.	Days.
7	Baron, Charles Christopher	Mass.	Oct. 1, 1880	19	0	8	11	14	7	88	0	0
*3	**Biddle, Andrew Porter**	Mich.	Oct. 1, 1880	18	7	6	22	4	1	109	0	0
*1	**Capps, Washington Lee**	Va.	Oct. 1, 1880	16	8	1	12	3	2	12	0	0
14	Crisp, Richard Owens	Md	Oct. 1, 1880	18	9	4	14	22	23	173	0	0
9	Dargan, Milton	S. C.	Oct. 1, 1880	18	7	9	16	7	5	175	0	0
18	Davis, Edward	Penn.	Oct. 1, 1880	20	8	19	5	12	13	127	0	0
13	Fahs, Charles Marion	Ala	Oct. 1, 1880	17	9	13	22	8	8	152	0	0
16	Field, Horace Almeron	N. Y.	Oct. 1, 1880	19	3	14	13	12	15	84	0	0
6	Hewes, Charles Hinman	Penn.	Oct. 1, 1880	16	4	3	7	18	21	55	0	0
12	Hill, Frank Kinsey	Ohio	Oct. 1, 1880	19	6	10	8	10	19	93	0	0
8	Hughes, Arthur Lewis	Ohio	Oct. 1, 1880	19	9	12	25	1	4	84	0	0
4	Hulme, Walter Oliphant	N. J	Oct. 1, 1880	20	10	7	4	8	10	57	0	0
20	Jones, Horace W	Va.	Oct. 1, 1880	19	1	18	14	17	11	60	0	0
21	Keilholtz, Pierre Otis	Md	Oct. 1, 1880	18	5	20	3	26	20	64	0	0
*2	**Knepper, Chester Mahlon**	Penn.	Oct. 1, 1880	18	9	2	21	2	12	81	0	0
11	Loomis, Frederic James	Conn.	Oct. 1, 1880	18	0	11	2	16	14	31	0	0
19	McCay, Henry Kent	Ga.	Oct. 1, 1880	20	5	15	17	18	9	84	0	0
22	Mathews, Albert Clifton	Ohio.	Oct. 1, 1880	18	10	23	6	21	22	119	0	0
26	Orr, Robert Hunter	Del	Oct. 1, 1880	20	0	26	26	25	24	113	0	0
5	Parmenter, Henry Earl	R. I.	Oct. 1, 1880	19	6	4	1	20	25	52	0	0
24	Pattison, Thomas Putnam	Md	Oct. 1, 1879	19	6	22	10	24	18	93	2	17
25	Richardson, Thornton Russell	Penn.	Oct. 1, 1880	20	1	25	24	23	26	95	0	0
23	Starr, John Burton	Kans.	Oct. 1, 1880	19	2	24	17	15	17	73	0	0
10	Wedderburn, Lawrence Alexander	Va.	Oct. 1, 1880	18	0	17	9	11	3	40	0	0
17	Werntz, Robert Lincoln	Penn.	Oct. 1, 1880	19	4	21	19	5	6	49	0	0
15	Whittlesey, Humes Houston	Ind	Oct. 1, 1880	19	1	16	20	6	15	34	0	0

CADET-ENGINEERS.

Fourth class—25 members.

Name.	State.	Date of admission.	Age at date of admission.		Relative standing as determined at examination for appointment.
			Years.	Months.	
Bispham, Harrison Augustus	Pennsylvania	Oct. 1, 1881	16	8	21
Bootes, James Thomas	Delaware	Oct. 1, 1881	17	10	1
Boyd, Harry Lansdale	Maryland	Oct. 1, 1881	18	11	4
Chase, Volney Ogle	Louisiana	Oct. 1, 1881	20	2	7
Culver, William Wesley	Illinois	Oct. 1, 1881	21	7	24
Dashiell, Julius Matthias	Maryland	Oct. 1, 1881	19	11	14
Dieffenbach, Albert Christian	Pennsylvania	Oct. 1, 1881	18	9	23
Evans, George Robert	Massachusetts	Oct. 1, 1881	18	7	12
Fenton, Theodore Cornell	Pennsylvania	Oct. 1, 1881	18	8	8
Joynes, Walker Waller	Tennessee	Oct. 1, 1881	19	1	22
Kline, George Washington	New Jersey	Oct. 1, 1881	17	9	15
McCormick, Charles Monod	Virginia	Oct. 1, 1881	19	6	19
McCusker, James Francis	Maryland	Oct. 1, 1881	18	11	20
McKay, William	Pennsylvania	Oct. 1, 1881	16	9	11
Miller, William Gardner	Virginia	Oct. 1, 1881	16	9	9
Mulford, Harry Boone	New Jersey	Oct. 1, 1881	19	1	13
Rust, Armistead	Virginia	Oct. 1, 1881	19	3	3
Shields, William	Virginia	Oct. 1, 1881	18	10	6
Stanworth, Charles Semmes	Virginia	Oct. 1, 1881	17	2	16
Stebbins, Charles Wallace	Maryland	Oct. 1, 1881	19	9	25
Strauss, Joseph	Virginia	Oct. 1, 1881	19	10	26
Tawresey, John Godwin	Delaware	Oct. 1, 1881	19	8	10
Taylor, David Watson	Virginia	Oct. 1, 1881	17	7	2
Ueberroth, Preston Henry	Pennsylvania	Oct. 1, 1881	18	11	5
Warfield, Louis Edwin	Maryland	Oct. 1, 1881	17	3	17

SUMMARY.

October 1, 1881.

CADET-MIDSHIPMEN.

First class	37 members.	
Second class	38 members.	
Third class	38 members.	
Fourth class	48 members.	
		161

CADET-ENGINEERS.

First class	23 members.	
Second class	26 members.	
Third class	26 members.	
Fourth class	25 members.	
		100
Total		261

DEATHS, RESIGNATIONS, AND DISMISSALS.

November 2, 1880, *to November* 4, 1881.

DIED.

Cadet-Midshipman Charles J. Dudley		Nov. 8, 1880
Cadet-Engineer William Lang	(at Buffalo, N. Y.)	Nov. 15, 1880
Cadet-Midshipman Edmund E. Kiefer		Nov. 18, 1880
Cadet-Midshipman Byron G. Pierce		Nov. 28, 1880
Cadet-Engineer Edward K. Taylor		Dec. 10, 1880
Cadet-Midshipman James J. G. Cooper	(at Washington, D. C.)	Sept. 16, 1881

DISMISSED.

Cadet-Midshipman Frank F. E. Lodeman	May 5, 1881
Cadet-Midshipman Stephen Ashby	May 5, 1881
Cadet-Engineer Herman Eckel	June 4, 1881

DROPPED.

Cadet-Midshipman William A. Gresham	June 14, 1881
Cadet-Midshipman William W. Russell	June 14, 1881
Cadet-Midshipman Max A. Orlopp	June 14, 1881
Cadet-Midshipman Edward N. Bell	June 14, 1881
Cadet-Midshipman John J. Conway	June 14, 1881
Cadet-Midshipman Thomas W. Hayden	June 14, 1881
Cadet-Midshipman Charles R. Reynolds	June 14, 1881
Cadet-Midshipman William W. Ricketts	June 14, 1881
Cadet-Midshipman Edwin G. Temple	June 14, 1881
Cadet-Midshipman Edward R. Cassidy	June 14, 1881
Cadet-Midshipman William G. Ganong	June 14, 1881
Cadet-Midshipman Arlington L. Lovenskiold	June 14, 1881
Cadet-Midshipman Charles Venable	June 14, 1881
Cadet-Midshipman James F. Carpenter	Oct. 18, 1881
Cadet-Engineer Daniel E. Gladstone	Oct. 18, 1881

RESIGNED.

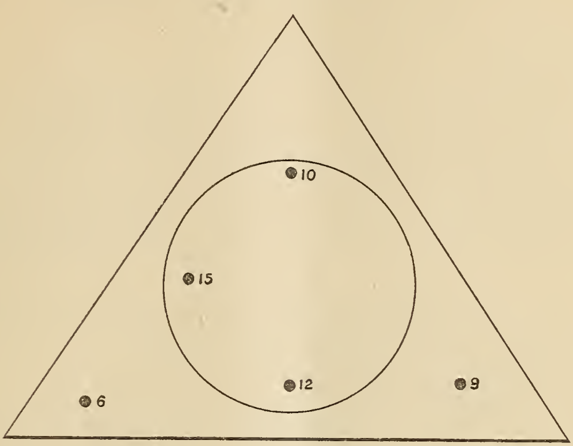
Cadet-Midshipman John H. Lindsey	Nov. 2, 1881
Cadet-Midshipman Walter E. Morris	Nov. 8, 1880
Cadet-Midshipman James W. Smythe	Nov. 8, 1880
Cadet-Midshipman Charles R. Mitchell	Jan. 17, 1881
Cadet-Midshipman Foxhall A. Parker	Jan. 27, 1881
Cadet-Midshipman Edward E. Solomon	Mar. 1, 1881
Cadet-Engineer Henry L. Simpson	Mar. 1, 1881
Cadet-Midshipman Michael E. Lennon	Sept. 29, 1881
Cadet-Midshipman Charles T. Phythian	Oct. 18, 1881

WITHDRAWN.

Japanese Student Sadanori Youchi	April 23, 1881

TARGET PRACTICE—GREAT GUNS.

U. S. Gunnery-ship Santee, Annual Examination, 1881.—Cadet-Midshipmen, Class of 1881.

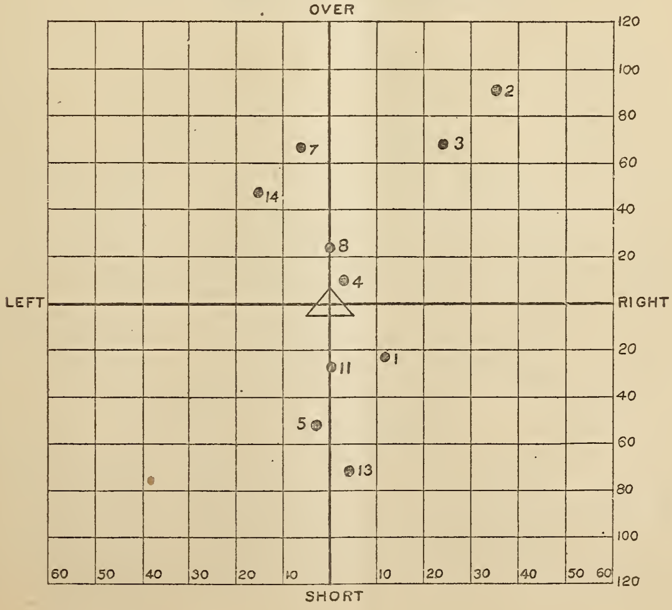


6. George E. Perry; 9. Samuel Bryan; 10. Eugene Carroll; 12. H. C. Haines; 15. W. L. Emmet. Number 6 struck the target on ricochet; numbers 12 and 15 carried away the target.

Target, 12 feet in width and 9 feet high; gun, 8-inch S. B.; projectile, shell; distance, 1,000 yards; fuse, 3½ seconds. Whole number of fires, 15; number of hits, 5.

Rectangle of fire—Distances in yards.

[Light breeze from the right across the line of fire.]



SUMMER CRUISE, 1881.

OFFICERS AND CADET-MIDSHIPMEN

ATTACHED TO THE

UNITED STATES PRACTICE-SHIP CONSTELLATION.

Commander F. V. McNAIR, *Commanding.*
Lieutenant-Commander C. M. THOMAS, *Executive Officer.*
Lieutenant J. W. MILLER, *Navigator.*
Lieutenant D. DELEHANTY, *Watch Officer.*
Lieutenant M. F. WRIGHT, *Watch Officer.*
Lieutenant C. P. REES, *Watch Officer.*
Master C. W. BARTLETT, *Watch Officer.*
Lieutenant H. W. SCHAEFER, *Instructor in Navigation.*
Paymaster L. G. BILLINGS.
Surgeon J. G. AYERS.
Passed Assistant Surgeon A. G. CABELL.
Chaplain J. S. WALLACE.

Cadet-Midshipman A. R. Hasson.

CADET-MIDSHIPMEN.

First class (36).

Anderson, E. A.
Arnold, J. T.
Bennett, L. S.
Blandin, J. J.
Doyle, J. G.
Duncan, W. B.
Eames, H. H.
Field, W. R. M.
Fletcher, W. B.
Fowler, H.
Grambs, W. J.
Gwyn, L. S.
Horst, H. A.
Howard, W. L.
Hubbard, N. M.
Jayne, J. L.
Johnston, M.
Kenkel, H. H.
Kent, G. E.
Key, A. L.
King, W. N.
McGiffin, P. N.
McNutt, F. A.
McWhorter, J. G.
Martin, C.
Nixon, L.
Paine, W. T.
Patterson, S. A. W.
Poyer, J. M.
Prince, T. C.
Savage, L. R.
Semple, L.
Stahle, F. H.
Sutphen, E. W.
Whittelsey, W. B.
Wood, S. S.

Third class (38).

Barker, W. A.
Beecher, A. M.
Bush, W. W., jr.
Carter, V.
Cook, W. E.
Curtis, F. E.
Davis, J. S.
Friedlander, H.
Harrell, J. R.
Hayes, C. H.
Hazeltine, C. W.
Hoggatt, W. B.
Jastremski, L. H.
Jones, H. P., jr.
Johnston, W.
Leary, T. H.
McCook, J. A.
McCord, H. H.
McCreary, W.
McDonald, J. D.

McIntire, A. E.
McKean, J. S.
McNulta, H.
Macpherson, V.
Maxcy, J. W.
Moseley, N. S.
O'Malley, W. A.
Plunkett, C. P.
Seymour, I. K.
Shoemaker, W. R.
Smith, S. F.
Sparling, F. H.
Stevens, R. R. W. B.
Terrell, D. F.
Welles, R., jr.
Williams, C. S.
Williams, W. P.
Wirt, W. E.

Fourth class (6).

Atwood, J. C.
Gilmer, W. W.
Lamison, J. G.
Raichle, F. G.
Sargent, F. H.
Sloan, A. B.

The Constellation sailed from Annapolis Roads June 16, and entered Buzzard's Bay June 29; from thence proceeded to Newport, R. I., and returned to Buzzard's Bay.

August 16 sailed for Chesapeake Bay, and anchored off the Naval Academy on the evening of August 27, 1881.

UNITED STATES PRACTICE-SHIP DALE.

Commander P. F. HARRINGTON, *Commanding.*
Lieutenant A. WALKER, *Executive Officer.*
Lieutenant E. D. TAUSSIG, *Navigator.*
Lieutenant A. McCRACKIN, *Watch Officer.*
Lieutenant J. B. MURDOCK, *Watch Officer.*
Lieutenant H. L. GREEN, *Watch Officer.*
Master T. B. HOWARD, *Watch Officer.*
Assistant Paymaster J. R. MARTIN.
Passed Assistant Surgeon W. H. RUSH.

CADET-MIDSHIPMEN.

Second class (41).

Agee, A. P.
Alexander, R. C.
Balthis, H. H.
Barkley, R. W.
Barnard, J. H.
Bowman, W. E.
Brady, C. T.
Carpenter, J. F.
Chapin, F. L.
Colvin, F. R.
Dalrymple, E. W.
Dovalé, A.
Frazier, R. T.
George, H.
Gignilliat, T. H.
Gray, W. T.
Greene, S. D., jr.
Jackson, J. A.
Jackson, J. B.
Keith, A. S.
Ledbetter, W. H.
Legaré, A. B.
Lennon, M. E.
Lerch, R. L.
Megrath, W. A.
Mitchell, S. Z.
O'Leary, T. S.
Pettit, H. C.
Philbin, P. H.
Phythian, C. T.
Smith, T. B.
Stout, G. C.
Street, G. W.
Sweeting, C. E.
Thurston, B. E.
Toney, T. V.
Von Schrader, G. M.
Weeks, E. B.
Wilson, W. J.
Witherspoon, T. A.
Woods, R. H.

Fourth class (15).

Crisfield, J. A. P.
Clark, H. D.
Corpening, C. M.
DeKrafft, J. C. P.
Gibson, R. E. L.
Jacobs, B.
Nes, D. S.
Russell, R. L.
Scott, W. S.
Shindel, J. E.
Shipley, R. T.
Slade, T. B.
Tilden, E. W.
Treadway, H. B.
Van Keuren, J.

The Dale sailed from Annapolis Roads June 18, and touched at Hampton Roads; from thence proceeded to Buzzard's Bay, and joined the Constellation June 30; from thence to Newport, R. I.; returned to Buzzard's Bay.

August 15 sailed for the Chesapeake, and anchored off the Naval Academy on the evening of August 27, 1881.

UNITED STATES PRACTICE-STEAMER STANDISH.

Lieutenant-Commander S. H. BAKER, *Commanding.*
Lieutenant B. F. TILLEY, *Executive Officer.*
Assistant Paymaster T. J. COWIE.
Passed Assistant Engineer W. A. WINDSOR.
Assistant Engineer G. B. RANSOM.

CADET-ENGINEERS.

First class (24).

Addicks, W. R.
Chambers, W. H.
Clarke, A. H.
Coley, F. E.
Conant, F. H.
Creighton, W. H. P.
Day, W. B.
Ferguson, G. R.
Fitts, J. H.
Gatewood, R. W.
Gladstone, D. D.
Gsantner, O. C.
Hawthorne, H. L.
Higgins, R. B.
Howland, C. H.
Leonard, J. C.
Leopold, H. G.
McAllister, A.
Miller, P.
Pendleton, J. H.
Rommell, C. E.
Theiss, E.
Willis, C. C.
Winchell, W. P.

UNITED STATES PRACTICE-STEAMER MAYFLOWER.

Lieutenant-Commander JOHN SCHOULER, *Commanding.*
Lieutenant F. G. HYDE, *Executive Officer.*
Assistant Paymaster R. T. M. BALL.
Passed Assistant Surgeon L. B. BALDWIN.
Passed Assistant Engineer J. S. OGDEN.
Cadet-Engineer S. ARNOLD.
Cadet-Engineer W. S. SMITH.
Cadet-Engineer D. W. C. REDGRAVE.

CADET-ENGINEERS.

Second class (25).

Aldrich, W. S.
Armistead, S. W.
Barnes, C. E.
Baxter, W. J.
Carswell, W. B.
Darrah, W. F.
Duvall, M., jr.
Dyson, C. W.
Eaton, C. P.
Ellenger, J.
Ellicott, J. M.
Field, H. A.
Gillis, H. A.
Glasscock, E. S.
Gross, C. J.
Halstead, A. S.
Herbert, W. C.
Lawrance, W. H.
Littlehales, G. W.
Palmer, J. E.
Quinby, I. H.
Ryan, P. J.
Webster, C. F.
Woodruff, C. E.
Zinnell, G. F.

The practice-steamer Standish, accompanied by the Mayflower, steamed from the Naval Academy June 14, and touched at Washington, D. C., Norfolk, Va., Edgemoor, Del., Wilmington, Del., Chester, Pa., Philadelphia, Pa., West Point, N.Y., Cold Spring, N. Y., Newburg, N. Y., Newport, R. I., Rocky Point, R. I., Providence, R. I., and Boston, Mass., visiting the different navy-yards, work and machine shops, iron foundries, etc., at the above-named places; and returned and anchored off the Nava Academy August 27, 1881.

TABLE OF COEFFICIENTS.

Department.	Subject.	Cadet-Midshipmen.						Cadet-Engineers.				
		Fourth class.	Third class.	Second class.	First class.	Graduating maxima for required studies.	Maxima for final examination.	Fourth class.	Third class.	Second class.	First class.	Graduating maxima for required studies.
Seamanship.	Seamanship	....	....	10	16	....	48					
	Naval Tactics	....	....	2	....	....	12					
	Ship-building	....	....	....	4	128	....	....	....	....	4	16
	Aptitude	....	....	....	....	....	12					
Ordnance and Gunnery.	Gunnery	....	....	....	....	....	48					
	Ordnance Instructions and Infantry Tactics	....	....	5								
	Ordnance and Armor	....	....	....	14	76						
Mathematics.	Algebra and Geometry	8	....	....	....	....	....	9				
	Trigonometry	....	8	....	....	....	....	....	6			
	Analytical Geometry	....	7	....	....	....	....	....	7			
	Descriptive Geometry	....	4	....	....	108	....	....	5	....	....	108
Steam-Engineering.	Steam-Engineering	....	....	....	....	....	48					
	Mechanical Drawing	....	....	...	....	....	....	3	5	5	6	
	Fabrication of Machinery	....	....	....	....	....	....			6	7	
	Designing Machinery	....	....	....	....	....	....	....	....	8	11	
	Marine Engines	....	....	....	13	52	....	....	....	....	11	
	Boilers	....	....	....	....	....	....	....	....	....	4	264
Astronomy, Navigation, and Surveying.	General Astronomy	....	....	6	....	....	....	....	....	4		
	Theoretical Navigation	....	....	....	8		48					
	Practical Navigation	....	....	....	9							
	Surveying and Compass Deviations	....	....	....		92		....	....	....	....	16
Physics and Chemistry.	Physics and Chemistry	....	6	5	....	....	....	....	4	5		
	Light and Heat	....	....	5	....	....	....	....	....	5		
	Electricity	....	....	....	6	88	....	....	....	....	6	
	Physical Measurements	....	....	....	....	....	....	....	....	....	7	108
Mechanics and Applied Mathematics.	Mechanics and Calculus	....	....	14	....	....	....	....	....	14		
	Applied Mechanics	....	....	....	....	....	....	....	....	....	11	
	Naval Architecture and Method of Least Squares	....	....	....	....	....	....	....	....	....	6	
	Elective Course in Naval Architecture	....	....	....	12	56	....	....	....	....	12	124
English Studies, History, and Law.	English and History	5	....	5	....	....	....	5	....	5		
	History and Rhetoric	....	6	....	....	....	....	....	6			
	Public Law	....	....	....	3	76	....	....	....	....	....	64
Modern Languages.	French	3	5	5	3	64	24	2	5	5	3	60
Drawing.	Drawing	3	2	....	....	20						
Maximum for each year, exclusive of electives		76	152	228	304	760	240	76	152	228	304	760
Deduction for each demerit		.004	.007	.013	.030	....	....	.004	.007	.013	.030	

MERIT-ROLLS FOR 1880-81.

Merit-rolls, made out annually for each class, show the proficiency of the cadets in each branch of study. The numbers given in the preceding table, showing the relative weight of the different branches, are used as coefficients; the final mark in each branch (*on a scale of* 4) *being multiplied by the number assigned to that branch. The sum of the products, after making deductions for conduct, is the final mark of the cadet for the year.*

In the case of cadets who take an elective course in any branch, the final mark in that branch is determined by adding to the final mark received in the required course one-fifth of the amount by which the final mark in the elective course exceeds 2.50.

In the graduating merit-roll, the final mark for the course is determined by the sum of the four yearly marks.

"*Cadets who attain* 85 *per cent. of the multiple in any year shall be distinguished by a star affixed to their names on the merit-rolls.*"—(*Regulations U. S. Naval Academy*, § 150.)

Cadets whose names are marked thus (†) *were found deficient, but were allowed to continue in their classes on condition of passing at a re-examination.*

Those marked thus (‡) *were found deficient, and turned back, to recommence the studies of their respective classes.*

Those marked (§) *were found deficient, and recommended to be dropped.*

(*a*) *denotes absence from examination.*

MIDSHIPMEN.

Class of 1879 (37 *members*). *Final examination, June,* 1881.

Order of merit.	Name.	Seamanship.	Naval tactics.	Gunnery.	Navigation.	Steam-engineering.	French.	Aptitude.	Aggregate for examination.	General aggregate for four years.	Final aggregate.
	Maxima for this class	**48**	**12**	**48**	**48**	**48**	**24**	**12**	**240**	**760**	**1000**
*1	**Randolph H. Miner**	46. 68	11. 58	43. 20	43. 80	42. 00	22. 20	9. 90	219. 36	673. 62	892. 98
*2	**John Hood**	41. 52	10. 20	41. 76	44. 40	38. 76	19. 20	8. 40	204. 24	667. 13	871. 37
*3	**Edward E. Hayden**	41. 76	8. 22	38. 76	37. 32	42. 00	20. 52	8. 10	196 ·68	654. 09	850. 77
4	Abner B. Clements	42. 36	10. 92	33. 12	37. 92	41. 40	17. 40	8. 70	191. 82	655. 49	847. 31
5	Henry S. Chase	43. 80	10. 20	37. 92	33. 48	40. 20	21. 12	11. 40	198. 12	628. 16	826. 28
6	Leroy M. Garrett	33. 24	9. 51	41. 88	40. 44	37. 80	21. 42	9. 00	193. 29	614. 46	807. 75
7	Charles C. Marsh	39. 36	10. 20	41. 88	38. 52	36. 00	21. 30	10. 20	197. 46	601. 42	798. 88
8	John B. Blish	47. 04	10. 56	36. 96	39. 96	41. 76	19. 92	9. 60	205. 80	586. 42	792. 22
9	Bobert S. Sloan	42. 96	8. 40	37. 92	38. 16	36. 60	15. 90	12. 00	191. 94	592. 38	784. 32
10	Charles W. Jungen	39. 72	9. 00	36. 60	35. 88	41. 40	20. 40	11. 70	194. 70	589. 23	783. 93
11	Charles H. Harlow	45. 60	9. 00	36. 48	36. 12	36. 60	20. 10	10. 50	194. 40	584. 40	778. 80
12	William A. Gill	44. 16	10. 26	40. 20	34. 92	41. 40	18. 30	7. 50	196. 74	573. 63	770. 37
13	Rennie P. Schwerin	46. 92	10. 32	34. 80	27. 96	41. 16	19. 20	11. 40	191. 76	571. 78	763. 54
14	Charles S. Ripley	40. 68	9. 81	37. 20	31. 68	37. 20	18. 60	7. 50	182. 67	556. 68	739. 35
15	Leigh O. Garrett	45. 36	11. 07	35. 04	30. 36	39. 36	16. 02	9. 00	186. 21	552. 13	738. 34
16	Walter J. Sears	34. 56	10. 29	34. 56	33. 72	41. 40	20. 10	9. 90	184. 53	552. 40	736. 93
17	John Gibson	37. 80	10. 11	32. 64	34. 56	35. 76	16. 50	10. 20	177. 57	555. 82	733. 39
18	James B. Cahoon	33. 84	9. 48	31. 08	33. 48	32. 16	15. 60	10. 20	165. 84	554. 39	720. 23
19	John A. Bell	40. 08	9. 27	37. 32	34. 56	36. 36	17. 52	7. 50	182. 61	531. 06	713. 67
20	John A. Dougherty	39. 00	9. 27	35. 16	28. 92	31. 80	20. 40	11. 10	175. 65	536. 82	712. 47
21	Daniel P. Menefee	32. 28	10. 44	37. 08	29. 04	30. 00	17. 10	8. 10	164. 04	548. 11	712. 15
22	John H. Gibbons	37. 56	7. 80	38. 40	33. 60	36. 60	19. 08	7. 50	180. 54	526. 95	707. 49
23	Thomas Snowden	32. 76	10. 86	32. 52	33. 48	27. 00	17. 10	10. 50	164. 22	541. 97	706. 19

24	Herbert J. Robinson	28. 80	10. 02	41. 16	32, 52	34, 20	17. 10	10. 20	170. 00	524. 66	694. 66
25	Edwin H. Tillman	41, 64	8. 58	29. 52	29, 28	30. 00	16. 80	10. 20	166, 02	528. 33	694. 35
26	John A. Mudd	41, 64	10, 71	39. 12	34, 68	33, 00	16. 50	9. 60	185. 25	508. 57	693. 82
27	Robert F. Lopez	39, 96	9. 96	36. 00	33. 00	27. 96	18, 30	7. 50	172. 68	514. 84	687. 52
28	Francis W. Kellogg	33. 72	7, 59	34. 20	30. 48	26, 40	18. 30	8. 40	159, 09	528, 00	687. 09
29	John L. Purcell	39. 24	8, 97	30. 60	30, 36	31, 80	20. 40	10. 50	171. 87	514. 51	686. 38
30	William A. Thom	35. 04	9. 24	30. 72	32. 04	27. 60	17. 10	9. 60	161. 34	515. 77	677. 11
31	Percival L. Drayton	38, 88	7. 56	30. 00	24. 96	22. 80	21. 90	9. 00	155. 10	514. 69	669. 79
†	Maurice L. Read	34. 80	5, 85	35, 76	27, 84	32, 40	20. 58	9. 30	166. 53	512. 13	678. 66
†	Reuben O. Bitler	33, 72	10, 89	37, 32	23, 64	30, 60	15, 00	9. 60	160. 77	484. 27	645. 04
†	Andrew C. Cunningham	35. 64	9, 00	24, 48	27, 60	36. 00	18, 00	7. 50	158. 22	521, 36	679. 58
§	Henry L. Sturdivant	31. 08	8, 73	36. 60	26, 04	35. 16	16. 80	4, 50	158. 91	488. 67	647. 58
‡	Guy W. Brown	27. 96	8. 70	25. 20	28, 20	26, 76	15, 90	7. 80	140. 52	518. 33	658. 85
†	George S. Welsh	25. 56	*a*	26, 64	*a*	31. 20	*a*	*a*	....	497. 63	....
	Albert G. Winterhalter (class of 1877)	32. 64	9. 47	38, 52	37, 44	37, 20	24. 00	9, 90	189. 18	621. 83	811. 01
	Wilson L. Todd (class of 1878)	35. 88	9. 90	36, 24	41. 04	25, 56	15, 30	7. 50	171. 42	526. 79	698. 21

CADET-MIDSHIPMEN.

Merit-roll of first class (76 members), annual examination, June, 1881, and general merit-roll for four years.

Order of general merit.	Name.	Seamanship.	Ship-building.	Ordnance.	Marine engines.	Theoretical navigation.	Practical navigation and surveying.	Electricity.	Naval architecture (elective).	Public law.	French and Spanish.	Conduct.	Aggregate for fourth year.	Aggregate for third year.	Aggregate for second year.	Aggregate for first year.	General aggregate for four years.
	Maxima	**64**	**16**	**56**	**52**	**32**	**36**	**24**	**3.60**	**12**	**12**		**304**	**228**	**152**	**76**	**760**
*1	**John L. Schock**	58. 08	14. 32	52. 50	46. 15	29. 60	33. 66	22. 50	3. 24	10. 74	10. 38	0. 45	280. 72	211. 40	143. 59	72. 03	707. 74
*2	**Joseph J. Woodward**	58. 56	13. 84	51. 38	48. 88	28. 72	32. 31	22. 56	2. 76	10. 56	10. 02	1. 17	278. 42	205. 47	134. 04	62. 96	680. 89
*3	**Joseph H. Linnard**	52. 64	13. 60	50. 96	47. 58	28. 16	34. 20	23. 40	3. 00	10. 59	10. 38	2. 19	272. 32	203. 30	135. 17	64. 89	675. 68
*4	**John A. Hoogewerff**	56. 00	12. 76	56. 82	46. 15	27. 20	32. 58	22. 86	2. 40	10. 86	10. 26	2. 25	269. 64	201. 32	132. 64	63. 63	667. 23
*5	**Francis E. Sutton**	51. 84	14. 16	51. 80	46. 80	28. 00	31. 68	21. 60	....	11. 04	12. 18	1. 14	267. 96	195. 27	129. 92	61. 01	654. 16
*6	**John L. Rees**	51. 68	12. 52	49. 00	40. 95	27. 60	30. 24	18. 90	1. 08	10. 65	10. 02	3. 99	248. 65	197. 38	138. 86	69. 27	654. 16
*7	**Robert B. Dashiell**	60. 96	14. 56	53. 20	43. 81	23. 76	28. 98	18. 96	....	9. 87	11. 85	0. 60	265. 35	194. 61	127. 47	61. 80	649. 23
8	Frederic C. Rider	47. 20	12. 68	46. 90	43. 42	26. 32	28. 98	22. 20	0. 96	9. 51	9. 84	3. 51	244. 50	198. 72	138. 37	62. 91	644. 50
9	Harry K. White	55. 68	14. 08	49. 14	46. 93	26. 16	31. 59	22. 14	1. 20	9. 90	10. 74	0. 96	266. 60	192. 79	125. 52	57. 77	642. 68
10	Lincoln Karmany	56. 64	12. 68	49. 56	42. 51	27. 76	32. 22	21. 90	....	10. 17	10. 92	1. 74	262. 62	196. 50	123. 09	59. 19	641. 40
11	Edward E. Capehart	53. 28	12. 28	49. 00	44. 46	26. 96	30. 42	21. 24	....	9. 45	11. 25	1. 65	256. 69	187. 33	122. 85	56. 25	623. 12
12	Eugene Carroll	53. 12	12. 36	46. 76	40. 30	25. 44	29. 70	18. 36	....	9. 69	10. 20	3. 09	242. 84	185. 52	124. 94	62. 33	615. 63
13	Houston Eldredge	59. 20	14. 52	48. 44	40. 43	24. 48	27. 00	15. 60	....	9. 96	9. 84	1. 89	247. 58	180. 56	118. 24	62. 01	608. 39
14	Tasuker Serata	49. 12	11. 04	45. 08	34. 71	25. 44	28. 17	19. 92	0. 96	9. 09	8. 43	2. 64	229. 32	180. 33	126. 52	63. 30	599. 47
15	Frank E. Bunts	55. 68	11. 76	46. 48	40. 95	22. 80	27. 81	17. 64	....	10. 23	10. 71	0. 90	243. 16	183. 11	116. 32	55. 53	598. 12
16	Charles H. Lauchheimer	51. 68	11. 28	45. 08	42. 51	24. 48	29. 25	20. 10	....	10. 47	11. 13	2. 55	243. 43	178. 63	118. 73	56. 36	597. 15
17	Robert P. Forshew	51. 52	12. 56	49. 14	43. 16	24. 08	29. 07	18. 24	....	10. 62	10. 20	1. 68	246. 91	176. 23	114. 97	58. 99	597. 10
18	William H. Stayton	51. 20	9. 80	41. 58	40. 82	26. 08	27. 54	21. 42	2. 04	10. 83	10. 05	4. 65	236. 71	183. 70	120. 54	55. 41	596. 36
19	Charles A. Doyen	54. 88	11. 84	46. 90	40. 69	22. 24	25. 38	18. 48	....	10. 05	10. 59	3. 90	237. 15	176. 16	117. 01	60. 60	590. 92
20	James E. Mahoney	50 88	13. 04	49. 42	43. 03	21. 12	25. 74	18. 90	....	11. 07	10. 92	2. 73	241. 39	169. 61	114. 69	61. 63	587. 32
21	Henry B. Wilson	54. 56	11. 96	44. 66	42. 64	25. 84	30. 33	17. 52	....	9. 54	8. 55	2. 34	243. 26	174. 32	112. 31	56. 53	586. 42

22	Horace Burlingame Andrews	55. 04	11. 64	43. 96	41. 21	23. 28	27. 09	17. 22	....	9. 60	10. 44	2. 37	237. 11	174. 36	113. 89	60. 46	585. 82
23	Felix H. Hunicke	52. 32	12. 52	45. 92	39. 26	22. 00	26. 19	15. 18	....	9. 18	11. 52	1. 80	232. 29	173. 65	113. 95	58. 27	578. 16
24	Franklin J. Moses	49. 44	11. 68	43. 82	40. 69	25. 44	27. 63	20. 58	....	9. 48	9. 63	3. 15	235. 24	173. 06	115. 50	53. 17	576. 97
25	Gilbert Wilkes	58. 72	14. 64	46. 76	41. 86	23. 20	26. 19	17. 88	....	9. 54	9. 72	3. 60	244. 91	175. 15	102. 95	48. 29	571. 30
26	Sotokichi Uriu	51. 84	11. 16	40. 88	36. 40	24. 80	26. 91	17. 46	....	9. 51	8. 73	1. 50	226. 19	168. 15	117. 22	58. 89	570. 45
27	Henry C. Haines	48. 48	12. 76	44. 24	37. 18	22. 24	26. 64	16. 38	....	9. 06	9. 54	4. 23	222. 29	167. 78	116. 27	62. 56	568. 90
28	George P. Blow	56. 48	14. 00	50. 12	40. 43	21. 76	25. 11	15. 12	....	9. 87	8. 85	3. 36	238. 38	171. 10	105. 03	52. 98	567. 49
29	George Barnett	53. 76	12. 52	46. 48	39. 26	22. 16	26. 01	18. 06	....	9. 60	8. 04	1. 26	234. 63	171. 03	110. 72	50. 77	567. 15
30	Con M. Perkins	47. 68	12. 44	43. 96	35. 36	20. 80	23. 94	16. 14	....	10. 14	9. 90	3. 09	217. 27	169. 25	123. 66	54. 98	565. 16
31	William F. Flournoy	47. 36	11. 12	42. 28	37. 83	21. 68	26. 37	18. 00	....	9. 78	11. 10	3. 60	221. 92	166. 41	109. 74	57. 71	555. 78
32	Frederick W. Smies	45. 60	12. 16	44. 66	37. 44	21. 12	25. 56	15. 78	....	8. 49	9. 66	2. 82	217. 65	168. 97	113. 11	55. 67	555. 40
33	James H. Colwell	47. 52	11. 96	46. 34	41. 34	23. 76	25. 83	17. 22	....	9. 36	10. 23	2. 67	230. 89	163. 94	107. 11	53. 17	555. 11
34	Henry L. Ballentine	50. 88	11. 64	43. 12	36. 66	21. 60	25. 11	16. 62	....	9. 96	9. 99	3. 39	222. 19	167. 64	107. 25	57. 76	554. 84
35	George Clarke	50. 88	12. 08	43. 12	40. 30	27. 04	29. 43	17. 76	....	9. 75	8. 49	3. 18	235. 67	159. 40	108. 49	50. 94	554. 50
36	William M. Robinson	50. 08	11. 84	48. 30	39. 78	22. 96	26. 82	17. 10	....	9. 78	8. 55	2. 64	232. 57	163. 15	103. 17	53. 95	552. 84
37	Guy M. Buck	51. 84	11. 60	44. 66	37. 57	24. 03	27. 81	17. 22	....	9. 42	8. 73	1. 29	231. 64	164. 70	107. 28	48. 35	551. 97
38	Samuel Bryan	53. 28	10. 84	44. 24	38. 74	22. 32	25. 47	16. 38	....	9. 27	9. 54	2. 25	227. 83	160. 14	104. 97	58. 90	551. 84
39	John W. Weeks	49. 92	11. 84	48. 44	39. 52	22. 16	26. 82	16. 98	....	9. 96	8. 25	2. 61	231. 28	166. 27	104. 16	49. 82	551. 53
40	Edward H. Harrison	49. 60	11. 12	39. 90	41. 08	20. 56	25. 11	16. 26	....	8. 52	8. 04	1. 53	218. 66	173. 27	106. 10	52. 77	550. 80
41	Charles P. George	50. 88	11. 88	44. 24	37. 18	23. 36	25. 38	16. 68	....	9. 30	9. 72	2. 16	226. 46	163. 54	105. 02	55. 52	550. 54
42	Ovington E. Weller	49. 60	10. 52	43. 68	36. 40	24. 56	27. 54	16. 68	....	9. 21	10. 17	3. 42	224. 94	163. 89	109. 31	51. 49	549. 63
43	Harry R. Cohen	52. 16	12. 36	48. 16	38. 09	20. 48	24. 66	15. 42	....	10. 11	10. 08	1. 38	230. 14	163. 56	102. 18	52. 43	548. 31
44	Charles W. Stewart	48. 32	10. 28	41. 30	38. 61	22. 88	27. 27	16. 92	....	9. 33	10. 44	3. 21	222. 14	161. 80	109. 26	54. 79	547. 99
45	John A. Kimball	50. 88	11. 40	39. 76	36. 53	22. 56	24. 66	16. 74	....	8. 73	9. 51	4. 02	216. 75	167. 37	108. 55	50. 84	543. 51
46	James Davis Crenshaw	48. 96	12. 24	42. 84	41. 47	22. 80	23. 40	17. 76	....	8. 82	10. 44	2. 16	226. 57	157. 37	106. 91	52. 43	543. 28
47	Ira McJunkin	52. 16	12. 12	45. 08	36. 92	21. 60	23. 67	16. 62	....	9. 51	9. 87	0. 90	226. 65	161. 70	103. 02	50. 28	541. 65
48	Robert P. Hains	47. 68	12. 00	44. 24	39. 26	20. 72	24. 21	15. 06	....	9. 21	9. 48	3. 57	218. 29	160. 17	108. 01	54. 75	541. 22
49	Rudolphus R. Cockle	51. 52	12. 20	41. 44	37. 31	21. 52	24. 57	15. 42	....	9. 33	9. 45	4. 38	218. 38	160. 37	106. 72	54. 74	540. 21
50	Spencer M. Kase	50. 56	10. 48	40. 46	34. 97	21. 28	23. 67	18. 06	....	9. 33	9. 81	2. 49	216. 13	160. 41	110. 42	51. 99	538. 95
51	David L. Printup	46. 72	11. 16	42. 98	37. 83	23. 04	24. 57	16. 62	....	9. 24	9. 66	4. 56	217. 26	160. 81	106. 16	51. 01	535. 24
52	Alexander S. McCrea	45. 92	11. 12	41. 72	35. 75	20. 08	24. 03	16. 50	....	9. 42	10. 38	4. 11	210. 81	156. 31	109. 08	58. 99	535. 19
53	William G. Ford	50. 72	10. 64	47. 04	36. 40	21. 04	25. 29	15. 90	....	8. 91	8. 64	3. 63	220. 95	162. 15	97. 76	49. 81	530. 67
54	William LeRoy Emmet	47. 52	12. 12	40. 18	38. 09	19. 68	23. 94	18. 60	....	8. 22	7. 56	5. 31	210. 60	161. 50	103. 19	54. 31	529. 60
55	Macdonough Craven	54. 72	11. 60	40. 04	38. 87	18. 72	23. 58	15. 54	....	8. 76	9. 69	4. 14	217. 38	159. 13	98. 20	53. 36	528. 07
56	Guy G. Rodgers	48. 64	10. 28	39. 34	36. 79	20. 56	24. 30	15. 12	....	9. 72	10. 08	4. 26	210. 57	154. 61	105. 77	55. 30	526. 25

CADET-MIDSHIPMEN.

Merit-roll of first class (76 members), annual examination, June, 1881, and general merit-roll for four years—Continued.

Order of general merit.	Name.	Seamanship.	Ship-building.	Ordnance.	Marine engines.	Theoretical navigation.	Practical navigation and surveying.	Electricity.	Naval architecture (elective.)	Public law.	French and Spanish.	Conduct.	Aggregate for fourth year.	Aggregate for third year.	Aggregate for second year.	Aggregate for first year.	General aggregate for four years.
	Maxima	**64**	**16**	**56**	**52**	**32**	**36**	**24**	**3.60**	**12**	**12**		**304**	**228**	**152**	**76**	**760**
57	Eugene M. Harmon	50.72	10.16	42.42	34.71	22.08	24.84	15.12	....	9.03	9.45	4.08	214.45	162.01	99.28	50.49	526.23
58	Michael J. Donnelly	44.80	12.20	42.56	37.96	21.92	24.30	17.40	....	9.18	10.38	3.42	217.28	157.74	100.71	49.90	525.63
59	James W. Dresser	48.00	10.68	40.74	38.48	21.52	25.02	16.44	....	9.03	8.37	5.13	213.15	153.54	103.82	53.23	523.74
60	Silas H. Wright	44.00	10.40	41.16	37.18	21.12	23.49	16.20	....	8.85	8.52	3.75	207.17	147.54	103.97	55.67	514.35
61	Ben Holliday Craig	49.44	10.04	38.64	36.66	20.00	24.03	16.50	....	9.45	8.94	3.15	210.55	151.81	98.00	53.29	513.65
62	Thomas H. Matthews	44.96	10.00	35.98	34.71	19.36	22.68	15.90	....	8.70	9.51	4.68	197.12	154.04	99.76	56.07	506.99
63	Samuel H. Williamson	43.20	9.20	37.80	36.27	19.60	23.49	15.60	....	9.06	9.60	4.35	199.47	150.99	101.96	53.90	506.32
64	Thomas L. Bonfils	44.32	9.40	37.66	33.15	21.04	24.75	15.06	....	8.70	7.98	3.93	198.13	150.33	95.81	49.53	493.80
65	Alexander C. Oliphant	40.48	10.00	39.20	34.58	19.68	22.68	14.46	....	9.24	8.58	1.44	197.46	148.96	96.97	49.02	492.41
66	Zebulon B. Vance	41.92	10.48	36.82	34.32	19.68	23.76	15.84	....	8.46	8.25	5.49	194.04	146.06	104.26	47.90	492.26
67	Llewelyn T. McKee	42.40	10.60	38.92	35.75	20.64	24.21	15.96	....	8.91	8.07	3.36	202.10	144.74	96.70	47.08	490.62
68	Daniel Morgan	45.28	10.00	38.92	34.71	19.60	23.76	14.22	....	8.67	7.80	3.96	199.00	144.37	99.80	47.27	490.44
§	Alexander R. Hasson	50.40	11.80	43.54	40.17	24.24	26.28	21.06	....	9.78	9.81	3.39	233.69	177.33	97.88	52.41	561.31
†	Arthur C. Parsons	43.84	9.32	40.46	33.80	19.44	24.30	15.24	....	8.88	8.28	3.06	200.50	155.15	102.87	56.00	514.52
§	Max A. Orlopp	46.56	10.52	37.94	35.23	20.00	24.93	16.02	....	8.10	7.86	5.31	201.85	149.74	101.36	53.38	506.33
§	William A. Gresham	43.20	10.40	38.36	35.23	17.12	22.05	14.10	....	8.10	8.16	2.04	194.68	151.49	109.82	50.01	506.00
†	Felton Parker	41.76	9.16	38.36	30.03	16.64	20.07	13.80	....	8.82	11.07	4.56	185.15	154.55	97.84	55.59	493.13
†	George E. Perry	43.84	8.84	37.38	33.15	19.28	22.77	15.30	....	8.73	8.67	4.74	193.22	147.61	99.41	48.44	488.68
§	William W. Russell	36.96	8.72	36.26	33.15	17.28	21.60	15.36	....	8.61	11.10	5.22	183.82	150.10	103.15	51.35	488.42
	Yonoske Enouye	35.04	....	31.36	....	*a*	*a*	....	....	6.33	....	0.33	72.40	104.50	62.98	36.49	276.37

CADET-MIDSHIPMEN.

Merit-roll of second class (38 *members*), *annual examination, June*, 1881.

Order of annual merit.	Name.	Seamanship.	Naval tactics.	Ordnance instructions and infantry tactics.	Astronomy.	Physics and chemistry.	Light and heat.	Mechanics and calculus.	English and history.	French.	Conduct.	Aggregate.
	Maxima	**40**	**8**	**20**	**24**	**20**	**20**	**56**	**20**	**20**		**228**
*1	**L. Nixon**	34.20	7.90	17.15	21.90	19.05	18.55	58.66	17.70	17.15	2.11	210.15
*2	**S. S. Wood**	36.90	7.54	18.40	19.80	15.50	16.80	49.28	15.00	15.65	0.73	194.14
3	J. T. Arnold	35.30	7.20	13.85	19.56	15.85	16.15	55.86	15.20	13.00	2.30	189.67
4	W. B. Fletcher	37.00	7.38	17.00	21.60	16.55	15.45	45.08	15.85	14.55	1.14	189.32
5	E. W. Sutphen	37.20	7.00	16.65	19.68	16.30	14.50	44.52	16.25	13.80	1.01	184.89
6	L. S. Bennett	30.70	7.40	15.75	19.38	15.70	15.95	43.82	17.40	17.95	1.61	182.44
7	M. Johnston	30.30	7.30	14.95	18.60	15.60	14.95	46.06	15.40	16.05	1.83	177.38
8	W. B. Whittelsey	34.80	7.48	17.30	19.44	14.55	15.10	42.00	14.15	13.15	0.99	176.98
9	J. L. Jayne	33.30	6.76	15.20	21.60	14.25	15.10	44.66	14.75	12.95	2.27	176.30
10	J. G. McWhorter	33.20	7.52	16.15	18.30	14.40	15.20	44.10	14.05	13.90	2.05	174.77
11	J. G. Doyle	33.20	6.92	16.85	19.62	15.60	14.20	41.44	13.70	12.95	1.96	172.52
12	T. C. Prince	31.80	6.54	15.40	18.78	14.00	14.40	39.76	15.40	15.40	0.45	171.03
13	J. J. Blandin	30.90	6.84	15.15	16.62	15.45	15.15	38.92	15.55	17.60	2.09	170.09
14	L. R. Savage	29.40	6.40	15.05	18.36	15.45	15.70	40.60	14.85	14.45	1.12	169.14
15	W. R. M. Field	32.80	6.96	14.60	17.70	14.05	12.90	41.86	14.05	16.50	2.53	168.89
16	E. A. Anderson	32.20	6.46	15.50	18.54	14.45	14.35	38.08	14.30	14.35	1.60	166.63
17	W. B. Duncan	36.00	7.52	15.95	15.60	12.75	12.80	37.94	13.70	16.45	2.44	166.27
18	A. L. Key	29.50	6.72	14.90	16.92	14.05	14.25	42.56	14.80	14.10	2.57	165.23
19	W. L. Howard	32.40	6.62	14.70	17.52	13.40	13.45	36.82	14.10	17.30	1.40	164.91
20	L. Semple	29.00	6.86	14.65	17.52	13.50	12.50	40.32	14.90	17.60	2.05	164.80
21	W. T. Paine	27.60	5.62	13.60	16.86	13.50	13.10	44.10	12.90	16.85	1.05	163.08
22	J. M. Poyer	30.30	6.14	14.55	17.04	13.55	14.35	39.62	14.60	14.10	2.22	162.03

CADET-MIDSHIPMEN.

Merit-roll of second class (38 *members*), *annual examination, June*, 1881—Continued.

Order of annual merit.	Name.	Seamanship.	Naval tactics.	Ordnance instructions and infantry tactics.	Astronomy.	Physics and chemistry.	Light and heat.	Mechanics and calculus.	English and history.	French.	Conduct.	Aggregate.
	Maxima	**40**	**8**	**20**	**24**	**20**	**20**	**56**	**20**	**20**		**228**
23	L. S. Gwyn	27. 00	7. 08	13. 20	17. 88	13. 95	13. 95	40. 74	15. 05	14. 55	2. 20	161. 20
24	H. A. Horst	28. 30	6. 72	13. 95	15. 60	14. 35	12. 50	37. 10	15. 95	17. 90	2. 07	160. 30
25	P. N. McGiffin	32. 70	5. 66	16. 85	16. 44	14. 00	12. 95	35. 42	14. 30	13. 30	2. 34	159. 28
26	W. J. Grambs	28. 40	6. 48	13. 85	17. 40	13. 75	13. 65	39. 48	14. 85	13. 10	2. 13	158. 83
27	H. H. Konkel	29. 60	6. 74	14. 75	15. 90	14. 00	13. 00	38. 22	14. 75	12. 95	2. 26	157. 65
28	N. M. Hubbard	32. 80	6. 50	13. 80	16. 50	14. 25	12. 80	36. 12	14. 30	12. 85	2. 43	157. 49
29	S. A. W. Patterson	30. 50	7. 14	16. 00	15. 72	13. 00	13. 10	36. 26	13. 25	12. 85	1. 95	155. 87
30	C. Martin	26. 50	5. 48	14. 00	15. 72	13. 45	13. 20	36. 12	13. 75	16. 35	2. 04	152. 53
31	F. H. Stahle	28. 10	6. 04	14. 65	16. 44	12. 90	12. 50	35. 14	12. 85	15. 55	2. 01	152. 16
32	H. Fowler	25. 60	6. 72	13. 00	16. 20	13. 35	13. 05	36. 12	14. 60	14. 05	2. 44	150. 25
†	W. N. King, jr	30. 70	6. 74	14. 75	16. 86	14. 05	11. 75	37. 52	14. 35	16. 25	2. 48	160. 49
†	H. H. Eames	34. 60	6. 82	15. 35	15. 60	15. 85	12. 30	36. 26	13. 10	13. 40	2. 96	160. 32
†	F. A. McNutt	27. 40	5. 52	14. 60	17. 22	16. 00	13. 90	40. 18	11. 75	14. 50	2. 46	158. 61
†	G. E. Kent	27. 30	6. 44	14. 50	16. 62	13. 00	12. 05	36. 12	13. 85	12. 55	2. 04	150. 39
§	J. J. Conway	24. 40	6. 32	13. 50	13. 98	12. 25	10. 10	33. 04	15. 05	15. 10	2. 18	141. 56
§	E. N. Bell	28. 40	5. 88	13. 25	14. 46	12. 55	11. 35	27. 44	14. 55	12. 00	1. 72	138. 16

CADET-MIDSHIPMEN.

Merit-roll of third class (47 *members*), *annual examination, June,* 1881.

Order of annual merit.	Name.	Seamanship.	Trigonometry.	Analytical geometry.	Descriptive geometry.	Physics.	History and rhetoric.	French.	Drawing.	Conduct.	Aggregate.
	Maxima............	12	32	28	12	16	24	20	8		152
*1	**S. D. Greene**............	11.04	30.80	27.93	11.70	13.88	21.60	17.70	6.86	0.55	140.96
*2	**G. W. Street**............	10.56	31.68	28.49	12.15	14.40	20.58	17.70	6.06	0.89	140.73
*3	**W. E. Bowman**..........	10.80	28.80	26.88	11.25	11.92	21.30	16.30	6.90	1.02	133.13
*4	**C. E. Sweeting**..........	9.57	30.16	26.11	11.52	12.84	20.10	16.70	6.62	1.84	131.78
*5	**J. B. Jackson**..........	9.69	29.44	25.48	10.86	13.24	19.74	16.95	6.64	0.45	131.59
6	R. W. Barkley..........	9.99	27.52	23.10	11.37	11.76	21.18	15.80	7.38	0.52	127.58
7	B. E. Thurston..........	9.87	26.48	24.36	11.07	12.68	18.42	16.60	7.10	0.73	125.85
8	M. E. Lennon...........	8.34	27.84	24.22	10.20	13.00	21.00	13.20	6.30	1.06	123.04
9	H. George	10.53	24.72	24.50	10.44	13.04	20.10	13.60	6.60	1.19	122.34
10	G. M. von Schrader.....	9.72	28.24	21.98	8.91	11.64	18.90	13.45	6.88	1.18	118.54
11	A. S. Keith..............	8.73	22.88	22.82	10.08	12.12	18.36	15.60	7.26	0.87	116.98
12	R. T. Frazier	8.25	24.24	22.33	9.57	11.40	19.62	16.05	6.22	0.72	116.96
13	F. L. Chapin.............	10.26	23.12	20.79	9.63	11.60	20.16	15.50	6.06	0.80	116.32
14	R. C. Alexander	9.45	22.88	21.14	9.75	12.28	18.36	14.45	6.78	0.45	114.64
15	C. T. Brady..............	9.09	23.12	20.79	8.73	10.26	19.68	16.10	7.10	1.28	113.69
16	W. A. Megrath..........	9.51	25.36	21.77	9.27	11.56	15.96	13.70	6.74	1.21	112.66
17	A. P. Agee	8.49	23.92	21.84	9.27	10.72	18.66	14.50	5.18	1.29	111.29
18	G. C. Stout	10.65	21.36	20.23	9.21	12.36	18.06	14.25	6.50	1.48	111.14
19	J. H. Barnard............	10.11	23.52	18.55	8.76	12.28	17.58	13.90	7.34	1.30	110.74
20	T. H. Gignilliat..........	8.40	23.12	21.98	9.69	11.28	17.04	13.30	7.18	1.36	110.63
21	J. A. Jackson...........	9.15	23.44	20.44	8.34	11.64	17.82	15.35	6.00	1.62	110.56
22	R. L. Lerch..............	8.73	20.56	19.46	8.16	12.12	18.54	17.00	6.80	1.22	110.15
23	R. H. Woods.............	9.06	21.84	18.90	8.79	10.64	16.98	16.30	5.84	0.56	107.79
24	T. A. Witherspoon	9.57	22.08	18.41	8.58	12.12	17.76	14.15	5.98	0.93	107.72
25	H. H. Balthis............	8.88	22.08	18.34	8.10	12.24	18.48	14.00	6.24	0.80	107.56
26	P. H. Philbin............	9.03	21.12	21.63	8.16	10.60	17.16	15.10	5.72	0.98	107.54
27	E. W. Dalrymple	8.25	23.52	19.81	7.83	10.36	18.00	14.60	5.96	1.67	106.66
28	T. V. Toney	10.89	21.36	17.85	8.61	10.36	17.58	14.30	5.92	0.94	105.93
29	F. R. Colvin	8.28	21.84	19.04	8.46	11.32	18.24	14.35	5.10	1.07	105.56
30	T. S. O'Leary	9.06	20.64	18.83	7.80	11.20	17.10	14.80	6.80	0.75	105.48
31	S. Z. Mitchell...........	9.21	21.44	19.32	7.56	10.08	16.08	14.80	5.24	1.46	102.27
32	E. B. Weeks.............	7.80	21.44	19.11	8.22	10.44	16.68	14.05	5.60	1.53	101.81
33	W. H. Ledbetter........	8.10	21.68	18.27	7.29	10.32	15.42	12.95	5.56	1.12	98.47
34	W. J. Wilson	7.71	20.08	18.83	7.56	10.12	16.38	12.80	5.54	0.81	98.21
35	W. T. Gray...............	8.25	18.88	18.69	7.56	10.08	16.08	12.90	5.58	0.83	97.19
†	H. C. Pettit..............	7.32	23.12	18.97	7.23	10.36	18.18	13.80	6.56	0.83	104.71
§	T. W. Hayden...........	7.59	22.00	19.11	7.80	8.20	17.46	14.05	5.60	1.85	99.96
†	A. B. Legaré.............	8.61	22.08	18.20	7.59	8.64	15.18	13.35	6.06	1.24	98.47
†	A. Dovalé	8.58	18.56	18.90	7.80	9.80	15.36	13.85	6.52	1.16	98.21
†	J. F. Carpenter.........	8.10	20.00	18.41	7.95	10.32	15.48	12.15	6.20	1.31	97.30
†	T. B. Smith..............	8.40	20.56	17.99	6.84	9.88	17.10	12.80	5.18	1.73	97.02
†	C. T. Phythian	8.40	19.68	18.27	7.95	9.72	15.12	12.50	5.96	0.94	96.66
§	W. W. Ricketts	6.99	22.48	17.99	6.51	8.52	14.52	12.50	5.60	0.68	94.43
§	C. R. Reynolds..........	5.79	22.72	14.63	6.60	6.40	14.52	14.75	5.74	0.99	90.16
§	E. G. Temple	6.78	17.28	16.17	5.82	8.52	16.86	13.20	6.16	0.78	90.01
	J. J. G. Cooper	*a*	23.84	*a*	*a*	*a*	*a*	*a*	5.16	0.93	......
	C. T. Hepp..............	*a*	*a*	*a*	*a*	*a*	*a*	*a*	6.58	0.09	......

CADET-MIDSHIPMEN.

Merit-roll of fourth class (50 *members*), *annual examination, June*, 1881.

Order of annual merit.	Name.	Seamanship.	Mathematics.	History and English.	French.	Drawing.	Conduct.	Aggregate.
	Maxima	8	32	20	8	8	-	76
*1	**F. E. Curtis**	6.80	27.76	18.10	6.46	6.78	0.21	65.69
*2	**N. S. Moseley.**	7.66	27.92	17.65	6.00	6.82	1.02	65.03
3	C. P. Plunkett	6.96	30.48	15.35	5.78	6.60	1.18	63.99
4	Herbert McNulta	6.96	27.12	17.15	5.68	6.58	0.50	62.99
5	J. S. McKean	6.94	28.16	16.05	6.44	6.50	1.17	62.92
6	A. M. Beecher	7.36	27.84	15.80	5.32	6.96	0.60	62.68
7	C. S. Williams	6.04	27.36	17.25	6.02	5.64	0.26	62.05
8	Roger Welles, jr	6.72	27.04	15.70	5.78	6.92	0.22	61.94
9	H. P. Jones, jr	6.36	25.04	15.70	7.00	5.76	0.32	59.54
10	W. R. Shoemaker	7.24	24.08	16.25	5.74	6.96	0.76	59.51
11	T. H. Leary	6.48	26.32	15.10	5.60	5.68	0.24	58.94
12	W. B. Hoggatt	7.04	25.44	15.95	5.36	5.28	0.22	58.85
13	W. E. Cook	5.24	25.52	16.05	6.00	6.46	0.44	58.83
14	I. K. Seymour	6.34	24.32	15.95	6.30	5.66	0.11	58.46
15	Wirt McCreary	6.94	23.28	16.85	5.58	6.42	1.02	58.05
16	D. F. Terrell	6.38	24.48	16.50	5.68	5.36	0.44	57.96
17	C. H. Hayes	6.42	23.20	15.30	5.50	6.94	0.15	57.21
18	A. E. McIntire	6.30	23.28	15.50	6.02	6.60	1.19	56.51
19	S. F. Smith	6.56	21.44	16.05	6.02	6.56	0.15	56.48
20	J. D. McDonald	6.04	24.40	15.10	5.82	5.32	0.27	56.41
21	William Johnston	6.78	23.84	13.05	7.08	5.98	0.64	56.09
22	Harry Friedlander	5.46	26.08	13.65	6.10	5.44	0.84	55.89
23	L. H. Jastremski	6.20	25.44	12.85	6.58	5.76	1.02	55.81
24	J. R. Harrell	6.44	22.64	14.40	5.76	6.64	0.57	55.31
25	C. W. Hazeltine	6.30	22.08	16.00	5.54	5.58	0.64	54.86
26	W. A. O'Malley	6.12	24.00	13.15	5.32	6.28	0.38	54.39
27	Victor Macpherson	6.26	23.20	14.30	5.20	5.18	0.72	53.42
28	J. W. Maxcy	6.06	23.44	14.15	5.56	5.04	0.84	53.41
29	Vaulx Carter	6.66	21.44	12.95	5.68	7.04	0.44	53.33
30	W. E. Wirt	6.20	22.56	13.10	5.42	5.96	0.34	52.90
31	J. A. McCook	6.70	21.52	13.50	5.16	6.12	0.89	52.11
32	R. R. W. Stevens	5.84	20.08	14.50	6.14	5.42	1.16	50.82
33	W. A. Barker	5.50	20.40	13.60	5.14	6.28	0.44	50.48
34	W. P. Williams	5.88	20.00	12.65	5.34	6.40	0.32	49.95
35	H. H. McCord	6.10	20.00	13.05	5.44	5.96	1.26	49.29
36	F. H. Sparling	6.74	20.00	12.85	5.24	5.60	1.15	49.28
37	W. W. Bush, jr	5.48	20.24	13.40	5.06	5.56	0.62	49.12
§	A. L. Lovenskiold	4.60	21.44	14.10	6.10	4.88	1.03	50.09
‡	A. B. Sloan	5.82	18.64	15.80	4.84	5.16	0.55	49.71
†	J. L. Davis	6.74	19.04	13.40	5.14	5.56	0.38	49.50
†	W. W. Gilmer	6.28	20.00	11.70	5.76	5.86	0.14	49.46
§	E. R. Cassidy	5.76	20.48	12.25	5.08	5.76	1.32	48.01
‡	F. G. Raichle	6.34	21.52	9.05	4.84	6.52	0.37	47.90
‡	F. H. Sargent	6.12	17.20	13.00	5.24	6.76	0.53	47.79
‡	J. C. Atwood	6.60	16.64	12.95	5.10	5.58	0.73	46.14
‡	J. G. Lamison	5.76	16.40	12.10	5.62	5.48	0.87	44.49

CADET-MIDSHIPMEN—Continued.

Merit-roll of fourth class (50 *members*), *annual examination, June*, 1881.

Order of annual merit.	Name.	Seamanship.	Mathematics.	History and English.	French.	Drawing.	Conduct.	Aggregate.
	Maxima	**8**	**32**	**20**	**8**	**8**		**76**
‡	J. W. Wood	4. 80	14. 24	13. 95	5. 80	4. 94	0. 52	43. 21
‡	H. D. Blake	5. 50	20. 40	12. 60	5. 14	6. 28	0. 53	42. 75
§	Charles Venable	4. 36	17. 36	11. 55	5. 02	5. 18	0. 77	42. 70
§	W. G. Ganong	5. 90	10. 72	6. 05	4. 18	6. 54	1. 06	32. 33

4 N A R

CADET-ENGINEERS.

Merit-roll of first class (25 members), annual examination, June, 1881, and general merit-roll for four years.

Order of general merit.	Name.	Ship-building.	Mechanical drawing and fabrication.	Designing machinery and marine engines.	Boilers.	Electricity.	Physical measurements.	Applied mechanics	Naval architecture and method of least squares.	Naval architecture (elective.)	French and Spanish.	Conduct.	Aggregate for fourth year.	Aggregate for third year.	Aggregate for second year.	Aggregate for first year.	General aggregate for four years.
	Maxima	**16**	**56**	**88**	**12**	**24**	**28**	**44**	**24**		**12**		**304**	**228**	**152**	**76**	**760**
1	J. M. Whitham	13. 80	50. 68	80. 30	11. 25	20. 82	25. 20	42. 24	23. 22	3. 36	8. 82	1. 62	278. 07	188. 17	119. 21	57. 16	642. 61
2	Gustave Kaemmerling	11. 20	47. 88	69. 96	10. 50	19. 98	25. 20	37. 40	20. 58	2. 64	9. 78	2. 70	252. 42	178. 40	121. 66	62. 07	614. 55
3	Oliver B. Shallenberger	12. 04	51. 66	66. 44	10. 65	20. 40	26. 60	30. 91	16. 62	....	9. 33	3. 84	240. 81	177. 96	115. 40	57. 78	591. 95
4	James E. Byrne	11. 56	48. 58	67. 32	9. 57	20. 64	23. 80	35. 64	19. 56	2. 28	9. 54	3. 96	244. 53	169. 45	111. 52	59. 30	584. 80
5	Frank B. Dowst	11. 92	46. 20	70. 18	10. 35	18. 54	22. 40	33. 22	18. 00	1. 92	9. 63	3. 93	238. 43	167. 91	112. 04	54. 80	573. 18
6	Kenneth McAlpine	11. 56	44. 94	65. 78	8. 61	19. 14	24. 50	35. 09	19. 62	2. 16	10. 50	5. 19	236. 71	168. 40	109. 70	54. 42	569. 23
7	William S. Smith	11. 28	47. 60	68. 64	10. 59	22. 38	25. 90	32. 56	19. 08	2. 04	8. 46	2. 64	245. 89	162. 10	104. 43	53. 52	565. 94
8	William T. Webster	12. 40	50. 82	68. 42	10. 35	17. 70	23. 10	29. 59	18. 12	....	9. 00	3. 12	236. 38	166. 83	108. 96	53. 13	565. 30
9	Lloyd Bankson	12. 46	44. 38	65. 12	9. 84	18. 30	23. 80	31. 35	15. 90	....	8. 91	2. 43	228. 13	165. 21	113. 29	53. 33	559. 96
10	Clarence H. Mathews	12. 04	44. 24	68. 64	8. 85	19. 92	21. 00	36. 85	19. 20	2. 16	9. 54	2. 67	239. 77	160. 91	101. 11	50. 22	552. 01
11	De Witt C. Redgrave	10. 20	44. 94	62. 70	8. 94	17. 04	23. 80	31. 02	17. 04	. 96	8. 97	3. 12	222. 49	168. 21	107. 63	53. 62	551. 95
12	Robert Stewart, jr	10. 96	42. 70	62. 26	8. 43	18. 00	23. 80	30. 58	18. 72	. 96	9. 51	2. 04	223. 88	159. 66	108. 71	58. 95	551. 20
13	Isaac B. Parsons	11. 40	50. 12	63. 14	9. 72	15. 30	24. 50	29. 59	15. 84	....	8. 40	4. 74	223. 27	159. 67	111. 42	54. 65	549. 01
14	William W. White	11. 20	44. 24	67. 54	8. 70	18. 54	19. 60	35. 09	17. 46	1. 56	8. 40	3. 84	228. 49	162. 26	106. 41	49. 75	546. 91
15	Bias C. Sampson	10. 72	43. 96	62. 92	8. 28	16. 86	19. 60	36. 52	18. 06	2. 28	8. 49	3. 63	224. 66	155. 48	110. 31	55. 51	545. 96
16	Lyman B. Perkins	11. 36	48. 44	68. 64	9. 99	16. 98	21. 00	29. 04	16. 62	....	9. 27	4. 44	226. 90	157. 97	108. 48	52. 54	545. 89
17	Charles E. Belden	10. 80	41. 16	64. 46	8. 61	19. 56	23. 80	33. 44	15. 96	. 60	9. 30	1. 41	226. 28	169. 74	98. 02	50. 53	544. 57
18	Solon Arnold	11. 48	40. 74	61. 82	8. 76	17. 70	21. 70	34. 21	16. 14	. 60	9. 90	3. 06	219. 99	153. 90	106. 43	59. 26	539. 58
19	Arthur R. Bush	12. 12	47. 32	64. 46	8. 22	17. 04	24. 50	28. 05	16. 20	....	8. 28	4. 80	221. 39	155. 23	105. 99	55. 10	537. 71
20	Martin A. Anderson	11. 20	46. 06	62. 70	8. 91	15. 90	23. 10	27. 50	15. 00	....	9. 15	4. 53	214. 99	161. 12	105. 50	54. 51	536. 12
21	Thomas J. Hogan	10. 84	44. 10	55. 00	8. 31	17. 76	19. 60	27. 50	15. 12	....	9. 12	5. 19	202. 16	164. 29	93. 03	55. 96	515. 44

†	William H. Gartley	11.24	41.02	55.44	8.13	15.12	24.50	29.59	14.34	....	8.43	4.59	203.22	151.95	103.86	55.55	514.58
†	Albert Moritz	9.48	39.90	55.88	7.77	15.78	24.50	27.50	15.00	....	9.21	4.41	200.61	151.09	101.39	50.64	503.73
†	Robert J. Beach	9.08	43.26	52.80	7.74	14.40	20.30	27.50	15.00	....	8.73	4.56	194.25	150.39	100.68	52.03	497.35
§	Herman Eckel	10.16	38.22	50.82	6.75	14.52	17.50	28.93	13.74	....	10.32	.72	190.24	152.10	106.97	57.70	507.01

CADET-ENGINEERS.

Merit-roll of second class (25 members), annual examination, June, 1881.

Order of annual merit.	Name.	Mechanical drawing.	Fabrication of machinery.	Designing machinery.	Astronomy.	Physics and chemistry.	Heat and light.	Mechanics and calculus.	English and history.	French.	Conduct.	Aggregate.
	Maxima	**20**	**24**	**32**	**16**	**20**	**20**	**56**	**20**	**20**		**228**
*1	**Emil Theiss**	17.40	21.60	29.12	14.84	19.50	18.55	55.86	16.75	21.45	2.18	212.89
*2	**Robert W. Gatewood**	17.95	19.08	31.20	13.48	18.50	18.00	58.66	16.70	20.05	2.35	211.27
*3	**William H. P. Creighton**	17.45	20.40	28.88	13.64	18.40	17.65	50.26	16.95	18.55	.92	201.26
*4	**George Robert Ferguson**	19.10	21.06	28.40	13.84	17.50	16 60	51.24	14.90	16.75	.55	198.84
*5	**Peter Miller**	17.05	19.62	28.88	14.20	18.35	17.50	51.94	15.80	16.50	1.90	197.94
6	James Henry Fitts	17.35	19.02	25.92	14.04	17.90	16.65	48.30	15.50	20.10	1.86	192.92
7	William Henry Chambers	17.90	19.86	28.48	13.36	16.80	17.45	45.22	16.75	16.55	1.05	191.32
8	Charles Edward Rommell	17.10	18.78	24.96	13.24	16.00	16.45	42.14	15.45	16.40	1.13	179.39
9	Otto Charles Gsantner	16.65	21.66	24.96	11.56	17.10	15.00	40.60	14.85	16.60	1.30	177.68
10	Arthur Henry Clarke	15.25	16.98	22.80	13.52	14.85	15.55	42.00	15.85	16.95	1.42	172.33
11	Frank Henry Conant	15.85	20.46	24.08	12.08	16.15	14.65	35.98	14.95	15.85	2.14	167.91
12	Joseph Henry Pendleton	13.85	19.26	24.80	11.48	16.35	14.15	39.48	14.80	15.75	2.39	167.53
13	John Calvin Leonard	15.00	18.54	22.64	14.04	14.85	14.75	38.36	15.00	15.60	1.59	167.19
14	Clarence Calhoun Willis	15.10	19.74	21.44	12.56	14.30	14.60	39.48	15.20	16.55	2.55	166.42
15	Robert Barnard Higgins	17.10	20.10	20.96	11.52	17.00	15.00	38.22	12.50	15.55	1.61	166.34
16	Harry Leroy Hawthorne	17.25	19.02	21.92	12.28	15.85	13.60	38.78	14.80	14.75	1.96	166.29
17	Willis Bunner Day	15.95	20.52	24.24	11.20	14.60	13.10	36.68	15.45	15.05	1.13	165.66
18	Andrew McAllister	15.95	19.02	21.76	10.96	15.10	12.95	38.92	15.50	14.70	1.46	163.40
19	Walter Robarts Addicks	16.20	19.20	23.76	11.84	13.70	14.25	35.56	15.50	13.70	2.16	161.55
20	Charles Henry Howland	15.55	17.58	22 40	11.12	13.30	13.30	37.10	15.40	15.30	2.34	158.71
21	Ward Philo Winchell	16.50	19.86	22.64	11.00	13.95	13.05	35.00	12.50	15.50	2.51	157.49
22	Frederick Edward Coley	15.40	17.64	22.56	11.36	13.05	13.30	35.42	14.20	14.25	2.85	154.33
†	Harry Girard Leopold	15 35	19.92	25.68	10.64	15.10	13.60	41.30	12.05	13.30	2.65	164.29
†	Daniel D. Gladstone	16.10	18.18	20.16	10.36	13.95	13.40	33.60	13.40	14.25	2.26	151.14
‡	Thomas A. W. Shock	14.85	17.70	18.64	9.76	12.05	12.25	35.00	13.65	13.15	.92	146.13

CADET-ENGINEERS.

Merit-roll of third class (25 *members*), *annual examination, June*, 1881.

Order of annual merit	Name.	Mathematics.	Mechanical drawing and fabrication of machinery.	Physics.	History and rhetoric.	French.	Conduct.	Aggregate.
	Maxima	**72**	**20**	**16**	**24**	**20**		**152**
*1	**Samuel Wilson Armistead**	73. 26	17. 90	13. 80	20. 64	16. 45	. 43	141. 62
*2	**William Joseph Baxter**	70. 38	17. 15	14. 48	21. 78	17. 20	. 46	140. 53
*3	**Charles Phillips Eaton**	69. 66	16. 60	13. 56	18. 96	18. 00	. 66	136. 12
*4	**Charles Edward Woodruff**	67. 32	17. 70	14. 96	20. 28	16. 70	1. 03	135. 93
*5	**William Sleeper Aldrich**	66. 06	18. 25	14. 48	18. 18	15. 45	. 36	132. 06
*6	**John Morris Ellicott**	63. 90	17. 85	12. 52	20. 52	16. 95	. 50	131. 24
*7	**George Washington Littlehales**	60. 66	16. 40	14. 16	21. 60	17. 15	. 28	129. 69
8	Charles Wilson Dyson	63. 90	15. 60	13. 36	19. 08	16. 35	1. 04	127. 25
9	George Frederick Zinnel	62. 10	16. 15	12. 72	19. 74	16. 20	. 76	126. 15
10	William Francis Darrah	59. 04	16. 70	13. 84	19. 98	17. 40	1. 07	125. 89
11	Alexander Seaman Halstead	58. 32	15. 45	13. 24	18. 18	15. 85	1. 01	120. 03
12	Charles Edwin Barnes	53. 64	16. 65	12. 24	19. 44	16. 30	1. 18	117. 09
13	Harry Ashby Field	56. 34	16. 60	11. 40	17. 22	15. 00	. 15	116. 41
14	Charles Jacob Gross	54. 18	17. 25	11. 00	17. 16	16. 35	. 62	115. 32
15	Isaac Henry Quinby	50. 22	16. 20	12. 08	16. 38	17. 70	1. 74	110. 84
16	Harry Alexander Gillis	48. 60	16. 50	10. 24	18. 12	14. 95	1. 31	107. 10
17	William Cromwell Herbert	51. 12	14. 15	11. 44	16. 74	15. 20	1. 60	107. 05
18	Charles Franklin Webster	49. 68	14. 20	11. 96	16. 74	15. 85	1. 62	106. 81
19	William Beggs Carswell	49. 68	15. 65	10. 72	17. 58	14. 10	1. 11	106. 62
20	James Edward Palmer	48. 60	16. 90	11. 88	15. 60	13. 60	. 47	106. 11
21	Julius Ellenger	48. 06	14. 55	12. 04	16. 74	14. 50	1. 36	104. 53
22	William Hunter Lawrance	45. 72	16. 45	11. 44	16. 08	13. 35	. 92	102. 12
23	Philip Joseph Ryan	45. 18	14. 10	11. 36	15. 96	14. 75	1. 57	99. 78
24	Eustace Straughn Glascock	45. 00	13. 20	10. 92	16. 14	14. 40	1. 74	97. 92
†	Marius Duvall, jr	45. 54	15. 15	9. 44	15. 78	13. 35	1. 74	97. 52

CADET-ENGINEERS.

Merit-roll of fourth class (26 *members*), *annual examination, June*, 1881.

Order of annual merit.	Name.	Mathematics.	Mechanical drawing and fabrication of machinery.	English and history.	French.	Conduct.	Aggregate.
	Maxima	**36**	**12**	**20**	**8**		**76**
*1	**Washington L. Capps**	34. 20	9. 48	17. 65	8. 28	0. 05	69. 56
*2	**Chester M. Knepper**	33. 03	8. 61	18. 10	5. 96	0. 32	65. 38
*3	**Andrew P. Biddle**	31. 41	8. 34	17. 55	8. 32	0. 44	65. 18
4	Walter O. Hulme	30. 87	10. 74	16. 70	6. 38	0. 23	64. 46
5	Henry E. Parmenter	31. 86	11. 01	15. 15	5. 28	0. 21	63. 09
6	Charles H. Hewes	32. 22	10. 14	15. 30	5. 48	0. 22	62. 92
7	Charles C. Baron	30. 33	9. 57	16. 20	6. 88	0. 35	62. 63
8	Arthur L. Hughes	28. 98	7. 98	18. 85	7. 08	0. 34	62. 55
9	Milton Dargan	29. 52	8. 94	16. 75	6. 96	0. 70	61. 47
10	Lawrence A. Wedderburn	27. 09	9. 72	16. 45	8. 24	0. 16	61. 34
11	Frederic J. Loomis	29. 07	10. 89	15. 50	5. 86	0. 12	61. 20
12	Frank K. Hill	29. 25	9. 90	16. 60	5. 52	0. 37	60. 90
13	Charles M. Fahs	28. 80	8. 34	16. 70	6. 82	0. 61	60. 05
14	Richard O. Crisp	31. 86	9. 12	14. 40	5. 34	0. 69	60. 03
15	Humes H. Whittlesey	27. 27	8. 67	17. 35	5. 80	0. 14	58. 95
16	Horace A. Field	27. 45	9. 33	16. 35	5. 80	0. 34	58. 59
17	Robert L. Werntz	25. 56	8. 76	17. 50	6. 90	0. 20	58. 52
18	Edward Davis	26. 01	10. 71	16. 35	5. 90	0. 51	58. 46
19	Henry K. McCay	27. 36	8. 79	15. 30	6. 80	0. 34	57. 91
20	Horace W. Jones	26. 82	9. 12	15. 40	6. 00	0. 24	57. 10
21	Pierre O. Keilholtz	25. 65	10. 80	13. 50	5. 50	0. 26	55. 19
22	Albert C. Mathews	24. 21	10. 41	15. 10	5. 40	0. 48	54. 64
23	John B. Starr	24. 12	8. 79	15. 65	5. 78	0. 29	54. 05
24	Thomas P. Pattison	24. 66	9. 69	13. 90	5. 68	0. 37	53. 56
25	Thornton R. Richardson	23. 40	8. 16	14. 30	5. 20	0. 38	50. 68
26	Robert H. Orr	22. 68	7. 92	13. 65	5. 30	0. 45	49. 10

REGULATIONS

GOVERNING

THE ADMISSION OF CANDIDATES INTO THE NAVAL ACADEMY AS CADET-MIDSHIPMEN.

NOMINATION.

I. The number of Cadet-Midshipmen allowed at the Academy is one for every Member and Delegate of the House of Representatives; one for the District of Columbia; and ten appointed at large. According to the act of Congress approved June 17, 1878, "There shall not be at any time more in said Academy appointed at large than ten." As it will take some time before the number at large now at the Academy can be reduced to ten, there will be no such appointments at present.

II. The nomination of candidates for admission from the District of Columbia and at large is made by the President. The nomination of a candidate from any Congressional district or Territory is made on the recommendation of the Member or Delegate from actual residents of his district or Territory.

III. Each year, as soon after the 5th of March as possible, Members and Delegates will be notified in writing of vacancies that may exist in their districts. If such Members or Delegates neglect to recommend candidates by the 1st of July in that year, the Secretary of the Navy is required by law to fill the vacancies existing in districts actually represented in Congress.

IV. The nomination of candidates is made annually between the 5th of March and the 1st of July. Candidates who are nominated in time to enable them to reach the Academy on the 11th of June will receive permission to present themselves at that time to the Superintendent of the Naval Academy, for examination as to their qualifications for admission. Those who are nominated prior to July 1, but not in time to attend the June examination, will be examined on the 22d of September following; and should any candidate fail to report, or be found physically or mentally disqualified for admission, in June, the Member or Delegate from whose district he was nominated will be notified to recommend another candidate, who shall be examined on the 22d of September following. When any of the dates assigned for examinations fall on Sunday, the examination will take place on the following Monday.

V. A sound body and healthy constitution, good mental abilities, a natural aptitude for study and habits of application, persistent effort, an obedient and orderly disposition, and correct moral principles and deportment, are so necessary to success in pursuing the course at the Academy, that persons conscious of any deficiency in these respects are earnestly recommended not to subject themselves or their friends to the mortification and disappointment consequent upon failure, by accepting nominations and attempting to enter a service for which they are not fitted.

Students from the Empire of Japan are received for instruction under a resolution of the Senate and House of Representatives of the United States approved July 27, 1868.

EXAMINATION.

VI. Each candidate for appointment as Cadet-Midshipmen must present to the Academic Board satisfactory testimonials of good moral character, and must certify *on* *honor* to his precise age, which must be over fourteen and less than eighteen years at the time of the examination. No candidate will be examined whose age does not fall within the prescribed limits.

VII. Candidates must be physically sound, well formed, and of robust constitution; they will be required to pass a satisfactory examination before a medical board composed of the surgeon of the Naval Academy and two other medical officers to be designated by the Secretary of the Navy.

VIII. Any *one* of the following conditions will be sufficient to cause the rejection of a candidate:

Feeble constitution, inherited or acquired;

Greatly retarded development;

Permanently impaired general health;

Decided cachexia, diathesis, or predisposition;

All chronic diseases or results of injuries that would permanently impair efficiency, viz:

Weak or disordered intellect;

Cutaneous and communicable diseases;

Unnatural curvature of spine, torticollis, or other deformity;

Permanent inefficiency of either of the extremities or articulations from any cause;

Epilepsy or other convulsions within five years;

Impaired vision or chronic disease of the organs of vision;

Great hardness of hearing or chronic disease of the ears;

Chronic nasal catarrh, ozæna, polypi, or great enlargement of the tonsils;

Impediments of speech to such an extent as to impair efficiency in the performance of duty;

Chronic diseases of heart or lungs or decided indications of liability to cardiac or pulmonary affections;

Hernia or retention of testes in inguinal cavity;

Sarcocele, hydrocele, stricture, fistula, or hæmorrhoids;

Large varicose veins of lower limbs, scrotum, or cord;

Chronic ulcers.

Attention will also be paid to the stature of the candidate, and no one *manifestly* under size for his age will be received at the Academy. In the case of doubt about the physical condition of the candidate, any marked deviation from the usual standard of height will add materially to the consideration for rejection. Five feet will be the minimum height for the candidate.

The board will exercise a proper discretion in the application of the above conditions to each case, rejecting no candidate who is likely to be efficient in the service and admitting no one who is likely to prove physically inefficient. No candidate rejected by the board will be allowed a re-examination, and when rejected the department will not reverse the action of the board.

IX. The candidates must pass a satisfactory examination before the Academic Board in reading, writing, spelling, arithmetic, geography, and English grammar.

X. All the examinations, except in reading, will be written. Candidates who fall below the standard will receive a second and final examination in the subjects in which they fail. Deficiency in any one of the subjects at the second examination will be sufficient to insure rejection.

XI. "Candidates rejected at such examinations shall not have the privilege of another examination for admission to the same class unless recommended by the Board of Examiners."—(*Rev. Stat.*, § 1515.)

GENERAL CHARACTER OF THE QUESTIONS.

XII. ARITHMETIC.—*Notation and numeration.*—The candidate is required to express in figures any whole number, decimal, or mixed number, to write in words any given number, and to explain the Roman and Arabic systems of notation.

Denominate numbers.—The tables of money, weights, and measures in common use, including English money; addition, subtraction, multiplication, and division of denominate numbers; the relation existing between the troy and avoirdupois pound; number of cubic inches in a gallon; reduction of differences of longitude to their equivalents in time, and *vice versa.*

Fractions.—The candidate must be familiar with all the processes of common and decimal fractions, and is expected to be able to give clearly the reasons for such processes, and to be familiar with the contracted methods of multiplication and division given in the ordinary text-books on arithmetic.

Properties of numbers.—Test of divisibility of numbers by 2, 3, 5, 8, 9, 11, 25, 125, &c.; the resolution of composite numbers into prime factors; the method of determining whether any number is prime or composite, and of finding the greatest common divisor and the least common multiple of large as well as of small numbers.

Ratio and proportion.—Definitions and explanations of the nature of ratio and proportion; different methods of writing a proportion; solution of problems in simple and compound proportion.

Percentage, interest, and discount.—Examples usually given under these heads in arithmetic.

Mensuration.—The measurement of rectangular surfaces and volumes.

Evolution.—The extraction of square and cube roots.

Analysis.—Miscellaneous problems usually classed under this head, similar to those found in school arithmetics. It is essential that the candidate should be thoroughly proficient in all branches of arithmetic; unusual excellence in this will be allowed to count in his favor in case of a slight deficiency in other subjects.

Should persons intending to present themselves as candidates acquire a knowledge of algebra, it will be found to be of material assistance in the course of study pursued at the Academy, although not required for admission.

When practicable, should the candidate so prefer, algebraic solutions of problems may be substituted for arithmetical solutions.

GEOGRAPHY.—Candidates will be questioned on the grand divisions of the land and water; the character of coast-lines; the direction and position of mountain-chains and the locality of important peaks; the position and course of rivers, their tributaries, and the bodies of water into which they empty; the position of important seas, bays, gulfs, and arms of the sea; the political divisions of the land, their position, boundaries, and capital cities; the position and direction of great peninsulas, and the situation of important and prominent capes; straits, sounds, channels, and the most important canals; great lakes, and inland seas; position and political connection of important islands and colonial possessions; locality of cities of historical, political, or commercial importance (attention is specially called to the rivers and bodies of water on which cities are situated); the course of a vessel in making a voyage between well known sea-ports.

GRAMMAR.—Candidates will be examined in the whole of English grammar as treated in the common-school text-books, embracing the following subjects: The divisions of letters and the use of capitals; the parts of speech; the classification of *nouns*, and the distinctions of person, gender, and number; under *number*, the rules for the formation of the plural, nouns irregular and defective in number, the plural of proper names; under *case*, the different uses of the three cases, the rules for inflection, the changes in ending to denote case; the difference between the definite and indefinite *article*, and the use of *a* or *an;* the classification of *adjectives;* the explanation of the different degrees of comparison; the rules for *comparing adjectives;* irregular and defective comparison; numerals and their classification; the double classification of *pronouns*, first, into substantives and adjectives; secondly, into personals, relatives, &c.; peculiarities in the use of personal pronouns, as the difference between *my* and *mine*, between *thou* and *you*, and the various uses of *it;* compound personal pronouns; the double office of relatives, and the different classes of objects to which each of them is applied; compound relative pronouns; interrogative pronouns; adjective pronouns, or pronominal adjectives, and their classification; the classification and conjugation of *verbs;* the relations between transitive and intransitive verbs; the principal parts of regular, irregular, and defective verbs; the uses and inflection of auxiliaries; the essential peculiarities in the use of voice, mood, tense, number, and person; tense endings and personal endings; impersonal verbs; the classification, formation, and comparison of *adverbs;* conjunctive adverbs; the use of *prepositions, interjections,* and *conjunctions,* with the classification of the latter.

The rules for the construction and arrangement of words and sentences, given under syntax.

Parsing, according to the following model; giving in the case of each word the explanation of its grammatical relation to the other words in the sentence.

Noun: Class, gender, number, person, case.

Article: Definite or indefinite; qualified noun.

Adjective: Class, compared or not compared; comparison, if admitting it; degree of comparison; qualified noun.

Personal pronoun: Person, gender, number, case.

Relative pronoun: Person, gender, number, case, antecedent.

Interrogative pronoun: Gender, number, case.

Adjective pronoun (or pronominal adjective): Class; qualified word.

Verb: Class, form, principal parts, tense, mood, voice, person, number, subject.

Adverb: Class, derivation and comparison, if derived and compared; qualified word.

Preposition: Words between which the relation is shown by the preposition.

Interjection: The kind of emotion expressed.

Conjunction: Class; words or sentences connected.

READING.—Candidates will be examined in reading aloud English prose.

WRITING AND SPELLING.—Candidates will be required to write a short original letter, and an exercise in dictation, and to spell twenty-four words in common use.

An examination in English branches containing eight or more mistakes in spelling will not be considered satisfactory, and will be sufficient of itself to cause the rejection of the candidate.

ADMISSION.

XIII. Candidates who pass the physical and mental examinations will receive appointments as Cadet-Midshipmen, and become inmates of the Academy. Each cadet will be required to sign articles by which he binds himself to serve in the United States Navy eight years (including his time of probation at the Naval Academy), unless sooner discharged. The pay of a Cadet-Midshipman is $500 a year, commencing at the date of his admission.

XIV. Cadets, immediately after their admission, will supply themselves with the following articles; viz.,

One parade-suit	$37 72
One undress suit	20 95
One working-suit	2 42
One overcoat	23 30
One rubber coat	3 68
One pair rubber leggings	1 05
Two pairs white duck leggings	2 34
One pair gymnastic slippers	92
One parade-cap	3 69
One undress-cap	1 71
*Two pairs high shoes	11 50
*Eight white shirts	10 00
*Two nightshirts	1 76
*Four undershirts	2 24
Twelve linen collars	1 68
*Eight pairs socks	$1 84
*Four pairs drawers	2 24
*Six handkerchiefs	1 38
*Eight towels	2 00
Two pairs drill gloves	2 26
Two pairs Lisle thread gloves	54
*One pair suspenders	38
One neck-tie	50
Two clothes-bags	60
One hair mattress	6 68
One straw mattress	1 32
One hair pillow	93
One pair blankets	4 00
Two bedspreads	2 30
Six sheets	3 84

Four pillow-cases	$1 00
* One tooth-brush	20
* One hair-brush	60
* One whisk	15
* One coarse comb	11
* One fine comb	34
One mug	10
* One cake soap	10
One soap-dish	10
One requisition-book	32
One laundry-book	25
One pass-book	$0 27
One stencil, ink and brush	41
One bottle indelible ink	17
One rug	1 44
One wash-basin and pitcher	1 05
One looking-glass	95
One water-pail	70
One slop-bucket	70
One broom	27
Total	165 00

The articles marked *, not being required to conform to a standard pattern, may be brought by the cadet from home, but all other articles must conform to the regulations, and must, therefore, be supplied by the storekeeper.

Each Cadet-Midshipman must, on admission, deposit with the paymaster the sum of $20, for which he will be credited on the books of that officer, to be expended by direction of the Superintendent, in the purchase of text-books and other authorized articles besides those enumerated in the preceding article.

All the deposits for clothing and the entrance-deposit of twenty dollars must be made before a candidate can be received into the Academy.

SUMMARY OF EXPENSES

Deposit for clothing	$165 00
Deposit for books, &c	20 00
Total deposit required	185 00

The value of clothing brought from home is to be deducted from this amount.

Each Cadet-Midshipman, *one month after admission*, will be credited with the amount of his actual expenses in traveling from his home to the Academy.

XV. A Cadet-Midshipman who voluntarily resigns his appointment within a year of the time of his admission to the Academy will be required to refund the amount paid him for traveling expenses.

WILLIAM H. HUNT,
Secretary of the Navy.

EXAMINATION OF CANDIDATES FOR ADMISSION AS CADET-MIDSHIPMEN, 1881.

ARITHMETIC.

SEPTEMBER, 1881.—*Time allowed, three hours.*

1. Divide .765439 by 359.21 to five decimal places. Simplify $\frac{4.255 \times .0064}{.00032}$. Find the value of $\frac{1}{3.1415926}$ to seven decimal places. Find what decimal part 1178 yards 2 feet 9 inches is of 3 miles 3 furlongs 32 yards 8 inches.

2. Write down the *prime* factors of 13013, 798, 48841, 22011, and 5929. (None of the factors are greater than 30.)

Simplify $\frac{4\frac{1}{2} + 5\frac{1}{3} + 6\frac{1}{4}}{7\frac{1}{5} + 8\frac{1}{6} + 9\frac{1}{7}}$ of $\frac{9\frac{1}{2} + 10\frac{2}{21} + 11\frac{1}{24}}{1\frac{1}{4} + 2\frac{1}{10} + 3\frac{1}{12}}$.

3. Multiply £45 12*s.* $6\frac{3}{4}$*d.* by $12\frac{9}{25}$. Divide 345 lb. 9 oz. 16 dwt. 20 grs. by $13\frac{5}{7}$. Find the interest on £512 16*s.* 8*d.* for 3 years 7 months 21 days at $4\frac{5}{8}$ per cent.

4. Find the square root of .0288 to seven decimal places and the cube root of 3242 to five decimal places.

5. English sovereigns (pounds sterling) are coined from standard gold which contains 11 parts pure gold to 1 part alloy. Forty lbs. Troy of this metal are coined into 1869 sovereigns: what is the value in English money of a double eagle which weighs 516 grains, and is composed of 9 parts pure gold to 1 part alloy? What is the value in U. S. money of the English sovereign?

6. By what factor less than 1000 must 5789 be multiplied that the last three figures of the product may be 009? Explain your method. If the interest on $6075 at 5 per cent. be equal to the discount on $6176.25 for the same time at the same rate, when is the latter sum due?

ENGLISH BRANCHES.

SEPTEMBER, 1881.—*Time allowed, three hours.*

DICTATION.

These concluding words are of dangerous implication, and, certainly, it was not the intention of Edward, inferior to none of his predecessors in the love of power, to divest himself of that eminent prerogative which, although illegally, had been exercised by them all. But the Parliament took no notice of this reservation and continued with unshaken perseverance to insist on this incontestable and fundamental right, which he was prone enough to violate.

The proper business of the House of Commons was to petition for the redress of grievances as much as to provide for the necessities of the Crown. The throne was fixed upon a pinnacle which perpetual beams of truth and justice irradiate, though corruption and partiality may occupy the middle region and cast their chill shade upon all below.

SPELLING.

Jeopardy.
Irretrievable.
Isosceles.
Ethereal.
Indigenous.
Crevice.

Cinnamon.
Elementary.
Alimentary.
Britannia.
Cemetery.
Albatross.

Accelerate.
Tennis.
Tyrannical.
Worsted.
Enamel.
Miscellany.

Liquidate.
Phraseology.
Veteran.
Diffidence.
Horizon.
Javelin.

GRAMMAR.

I. (1) Give the principal parts (all forms) of seek, awaken, feel, dream, tread, cleave, set. (2) Give the possessive singular and plural of fancy, barley, abyss, mirage, echo. (3) Compare late, little, fore, beautiful. Define case, personal pronoun, infinitive mood.

II. Correct the following passage, and explain all the corrections: "My brother lives most all of nine miles from Topeka: it's sort of lonesome out there, and I reckon he don't like it much. You see it's considerable of a ways to go, but I'd as lives go as not."

III. Parse the words in italics: "*Never* within the memory of the *oldest*, not even on *that* night when *it* was known *that* the army *had declared* for the Parliament *that* had saved England, had *there* been *such rejoicing*."

GEOGRAPHY.

I. Give an account of the lakes, mountains, and river-valleys of Switzerland, showing their relative position and direction.

II. Where and on what water are the following: 1. Pembina. 2. Free Town. 3. Disco. 4. Rangoon. 5. Beirut (or Beyrout).

III. Name the capitals of England, Scotland, and Ireland, telling on what water each one is. Name the chief ship-building ports; the commercial ports; naval ports; manufacturing towns; capes; and fix the position of each.

IV. Name, fix position, and describe as fully as possible any three of the great river-deltas of the world.

V. What are the great feeders of the Caspian Sea? the Sea of Aral? Lake Winnipeg? Ohio River? (Name five of the last.)

RE-EXAMINATION.

ARITHMETIC.

SEPTEMBER, 1881.—*Time allowed, three hours.*

1. A yard being equal to .914 of a metre, what is the length of the metre in inches? (Four decimal places.)

2. What common fraction of a year of 365¼ days is 27 days 16 hours 29 minutes 4 seconds? (The fraction is to be in its lowest terms.)

3. Simplify $\dfrac{\dfrac{120}{119}-\dfrac{1}{239}}{1+\dfrac{1}{239}\text{ of }\dfrac{120}{119}}$ and $\dfrac{\dfrac{1}{40}+\dfrac{8}{27}+\dfrac{64}{125}}{\dfrac{1}{4}+\dfrac{4}{9}+\dfrac{16}{25}-\dfrac{19}{15}}$.

4. Find the cost of 36 miles 3 furlongs 22 yards of wire at £14 13*s*. 4*d*. per mile.

5. Find the interest on £395 14*s*. 6*d*. for 2 years 5 months 20 days at 3⅞ per cent.

6. Write the *prime* factors of 2401, 143143, 47311, 10985, and 24871.

7. If 8 lbs. 1 oz. 19 dwts. 9 grains cost £10 6*s*. 6*d*., what will be the cost of 13 lbs. 7 oz. 5 dwts.?

8. Find the square root of 3⅛ to six decimal places.

9. Find the cube root of $\frac{29}{64}$ to six decimal places.

10. English shillings are coined from standard silver which contains 37 parts of silver to 3 parts of alloy; one pound of this metal is coined into 66 shillings. Find the value of the English shilling in United States *silver* money, given that the United States dollar weighs 412.5 grains and consists of 9 parts of silver to 1 of alloy.

ENGLISH BRANCHES.

SEPTEMBER, 1881.—*Time allowed, three hours.*

DICTATION.

It was not apparently consistent with the primary object of retrieving the Christian affairs in Palestine to interfere in the government of a Christian empire; but the temptation of punishing a faithless people and the hope of assistance in their subsequent operations prevailed. They turned their prows up the Archipelago, and, notwithstanding the vast population and defensible strength of Constantinople, compelled the usurper to fly and the citizens to surrender. But animosities springing from religious schism and national jealousies were not likely to be allayed by such remedies. The Greeks, wounded in their pride and bigotry, regarded the legitimate emperor as a creature of their enemies.

SPELLING.

Isthmus.
Incipient.
Prestige.
Fallacy.
Gazetteer.
Polygamy.
Obelisk.
Rudiment.
Aëronaut.
Trestle.
Statistics.
Skeleton.
Technical.
Untenable.
Conglomerate.
Lucid.
Centennial.
Exorbitant.
Linear.
Sustenance.
Curfew.
Dentifrice.
Farinaceous.
Flagitious.

GRAMMAR.

I. (1) Explain the uses of the objective case. What verbs have distinction of voice? (2) Give the possessive plural of sea, valley, basis, stratum, bandit. (3) Give the principal parts of abide, cost, fling, grow. What is meant by mood? Compare gay, nigh, happy.

II. Correct, and explain corrections fully: It ain't likely as I am going to tell you who I see yesterday after I had gone and done it. I tell you it's me, and I don't never talk like I was mad.

III. Parse the words in italics: They were always a strange *family;* they rarely acted *like* other *people;* their hearts were in the right place, but their heads seemed *to be doing* anything *but what* they ought.

GEOGRAPHY.

1. Give an account of the West India islands, their names, relative position and size, important towns, and the names of the states to which they belong.

2. From what water and into what land do the following extend: 1. Gulf of Georgia. 2. Delagoa Bay. 3. Chesterfield Inlet. 4. Gulf of Cutch. 5. Gulf of Nauplia.

3. Where and on what water is Belgrade? Terre Haute? Ottawa? Madras? Ghent?

4. Fix the position of the following capes, telling from what land, and into what water, they project: 1. Matapan. 2. Comorin. 3. Agulhas. 4. San Lucas. 5. May.

5. Name and fix position of the following: 1. Three seaports of Italy. 2. Three mountain-ranges of Spain. 3. Three seaports of California.

REGULATIONS

FOR THE

APPOINTMENT OF CADET-ENGINEERS IN THE UNITED STATES NAVY.

I. In pursuance of law, applications will be received by the Navy Department for the appointment of Cadet-Engineers.

II. The application is to be addressed to the Secretary of the Navy, and can be made by the candidate or by any person for him, and his name will be placed on the register. The registry of a name, however, gives no assurance of an appointment, and no preference will be given in the selection to priority of application.

III. The number of appointments which can be made is limited by law to twenty-five each year. The candidate must not be less than sixteen or more than twenty years of age; he will be required to certify *on honor* to his precise age, to the Academic Board, previously to his examination, and no one will be examined who is over or under the prescribed age. His application must be accompanied by satisfactory evidence of good moral character and health, with information regarding date of birth and educational advantages hitherto enjoyed. Candidates who receive permission will present themselves to the Superintendent of the Naval Academy on the 15th of September for examination as to their qualifications for admission.

IV. The course of study will comprise four years at the Naval Academy, and two additional years at sea. All Cadets who finally graduate will be commissioned Assistant Engineers in the Navy as vacancies occur. The pay of a Cadet-Engineer while at the Naval Academy is $500 per annum.

V. The academic examination previous to appointment will be competitive, and will be on the following subjects, namely: Arithmetic; algebra, through equations of the first degree; plane geometry; rudimentary natural philosophy; reading; writing; spelling; English grammar; English composition; geography; free-hand drawing; and an elementary knowledge of the principles governing the action of the steam-engine. Candidates who possess the greatest skill and experience in the practical knowledge of machinery, *other qualifications being equal*, will have precedence for admission.

VI. The examination before the Medical Board is the same as that of candidates for appointment as Cadet-Midshipmen. See page 56.

The following deposits must be made before a candidate can be received into the Academy:

For clothing (see p. 58)	$165 00
For books and drawing instruments	50 00
Total	215 00

VII. Persons who contemplate presenting themselves as candidates for admission as Cadet-Engineers are cautioned that the number of applicants is large, and the competition exceedingly close. It is, therefore, useless for candidates to present themselves unless well prepared on the subjects of the examination, and unless their physical qualifications are within the prescribed standard.

COMPETITIVE EXAMINATION OF CANDIDATES FOR APPOINTMENT AS CADET-ENGINEERS, SEPTEMBER, 1881.

Number of competitors, 155.

ARITHMETIC.

Time allowed, three hours.

1. Reduce 3 miles 3 furlongs 30 yards 2 feet $1\frac{1}{2}$ inches to metres; given that 1 metre $=39.37079$ inches. (Result to be accurate to three decimal places.) Multiply 3.1415926536 by 2.7182818285, the result to be accurate to seven decimal places.

2. A tank is 4 feet 4 inches wide, 5 feet long, and 2 feet 6 inches deep; how many gallons (231 cubic inches) of water will it contain? Suppose that in measuring the quantity of water in this tank we allow that every 3 inches in depth gives 40 gallons, by what per cent. should the measurement be increased or diminished to make it accurate? (Result to five places.)

3. Find the square root of 26.02 and the cube root of 4844, each to seven decimal places.

4. Find the value, correct to seven decimal places, of $\frac{1}{7}+\frac{1}{3\times7^3}+\frac{1}{5\times7^5}+$ &c.

5. Find the interest on £896 7*s.* 6*d.* for 1 year 9 months at $4\frac{1}{2}$ per cent. The difference between the simple interest and the discount on a certain sum of money due in 4 months at 8 per cent. is $1.75; what is the sum? (Result to be *exact.*)

6. A can run a mile in 7 minutes 45 seconds; B can run $7\frac{3}{4}$ miles per hour; which is the faster runner, and in a race which the faster wins in 15 minutes, how much will the loser be behind? If A runs a mile in x minutes and B runs x miles per hour; what must be the value of x so that the rates may be the same? (Five decimal places.)

ALGEBRA.

Time allowed, three hours.

1. Multiply $a^{\frac{5}{2}}-2a^2b^{\frac{1}{3}}+4a^{\frac{3}{2}}b^{\frac{2}{3}}-8ab+16a^{\frac{1}{2}}b^{\frac{4}{3}}-32b^{\frac{5}{3}}$ by $a^{\frac{1}{2}}+2b^{\frac{1}{3}}$.
Simplify the fractions

$$\frac{a^3+ab^2-a^2b-b^3}{4a^4-2a^2b^2-4a^3b+2ab^3} \text{ and } \frac{1+x^{\frac{1}{2}}+x-x^{\frac{3}{2}}}{2x+2x^{\frac{3}{2}}+3x^2+3x^{\frac{5}{2}}}.$$

2. Find the greatest common divisor of $(ab-ac+b^2-bc)\,x+a^2c+ab^2-a^2b-abc$ and $(b-c)x^2+(2ab-2ac)x+a^2b-a^2c$. Separate each of the above quantities into its factors. Find the value of y which will make $2(y^2+y)x^2+(11y-2)x+4$ and $2(y^3+y^2)x^3+(11y^2-2y)x^2+(y^2+5y)x+5y-1$ have a common divisor.

3. Simplify $\frac{a^3(b^2-c^2)+b^3(c^2-a^2)+c^3(a^2-b^2)}{a^2(b-c)+b^2(c-a)+c^2(a-b)}$.
What is the value of the expression when $a=b=c$?

4. Simplify $\frac{1+\sqrt{3}}{2\sqrt{2}-3\sqrt{3}}$. Find the square root of $13+2\sqrt{30}$.

Simplify
$$\frac{2+\sqrt{3}}{\sqrt{2}+\sqrt{2+\sqrt{3}}}+\frac{2-\sqrt{3}}{\sqrt{2}+\sqrt{2-\sqrt{3}}}.$$

5. Solve the equations

$$\frac{a}{bx}+\frac{b}{ax}=a^2+b^2, \qquad \left\{\frac{m}{x}+\frac{n}{y}=a, \quad \frac{n}{x}+\frac{m}{y}=b\right\},$$

and

$$\frac{4x-17}{x-4}+\frac{10x-13}{2x-3}=\frac{8x-30}{2x-7}+\frac{5x-4}{x-1}.$$

6. Reduce $x^6-5x^5+4x^4-3x^3+2x^2-x+1$ to the form $Ax+B$, by means of the equation $x^2=2x-3$. Find the value of the above expression when $x=5$, and show generally that its value when $x=a$ is the same as the remainder when it is divided by $x-a$.

GEOMETRY.

Time allowed, two hours and a half.

1. Prove that the three bisectors of the angles of a triangle meet in a point. Prove that a bisector divides the opposite side into segments proportional to the adjacent sides. In an isosceles right triangle draw the bisectors, and find the distance from their common point to the hypothenuse, denoting the side by a.

2. Prove that if from a point without a circle two secants be drawn, the whole secants and the parts without the circle will be reciprocally proportional. State the proposition in another form in which the term *reciprocally proportional* is not used. Show how the proposition is modified when one of the secants becomes a tangent.

3. Prove that the area of a regular dodecagon inscribed in a circle is three times the square of the radius. Denoting the radius by b, find the length of a side of the dodecagon, and the area of the regular polygon of twenty-four sides inscribed in the same circle.

4. An octagon, side c, is to be formed from a square by cutting off the corners; what must be the side of the square? Show how the problem may be solved by a construction.

5. Chords are drawn from a fixed point in the circumference of a circle: find the locus of the middle points of the chords. Given a fixed chord in a circle, show how to draw, from a given point in the circumference, a second chord which shall be bisected by the first. From the obtuse angle of a triangle draw a line to the base which shall be a mean proportional between the segments of the base.

NATURAL PHILOSOPHY.

Time allowed, three hours.

1. How is the mass of a body measured? Define momentum and energy.

A weight of 24 pounds is suspended by two strings, one of which is horizontal and the other is inclined at an angle of 45° to the vertical: find the tension of each string.

2. Six vertical smooth posts are fixed in the ground at equal intervals round the circumference of a circle, and a cord without weight is passed twice round them all in a horizontal plane, and pulled together with a force of 100 pounds; find the magnitude and direction of the resultant pressure on each post.

A cylindrical vessel weighing 4 pounds and having an internal depth of 6 inches will just hold 2 pounds of water; the centre of gravity of the vessel when empty is 3.39 inches from the top: find the centre of gravity of the vessel and contents when full of water.

3. Determine the position of the centre of gravity of a triangle.

A man when weighed in a balance of the ordinary kind pushes with a walking-stick the beam of the balance at a point between the point of suspension of the scale-pan in which he stands and the fulcrum: determine what effect will be produced on his apparent weight.

4. How many pounds of water can an engine of 34 horse-power raise to the height of 2,376 feet in 5 minutes?

A weight of 8 cwt. is raised from a depth of 100 fathoms by means of a rope weighing 1 pound per foot: find the number of units of work expended.

5. A mass of 5 tons moves at the rate of 10 feet per second: find the number of units of work accumulated in it. If the mass is acted on by a force of 20 pounds in the direction opposite to that of the motion, find how far it will move before being brought to rest.

6. Find the space described by a falling body in one-twentieth of a second, beginning at the end of two seconds.

Two balls are dropped from the same point at different instants: show that, as they fall, the distance between them increases directly with the time.

7. A body whose specific gravity is 3.5 weighs 4 pounds in water: find the weight of the body.

A vessel contains mercury of specific gravity 13.6, on which floats a cube of iron of specific gravity 7.2; water is poured into the vessel until the cube is completely immersed: find what portion of the cube is below the surface of the mercury.

8. Determine the velocity of a body weighing 25 pounds when its energy is the same as that of a body weighing 64 pounds, which is moving at the rate of 5 feet per second.

Find the number of units of work expended in raising from the ground the materials for building a uniform column 50 feet in height and 10 feet square, a cubic foot of the materials weighing 112 lb. How high is the column when the work is half completed?

ENGLISH BRANCHES.

Time allowed, three hours.

DICTATION.

But this attendance in Parliament of inferior tenants-in-chief, some of them too poor to have received knighthood, grew insupportably vexatious to themselves, and was not well liked by the king. He knew them to be dependent upon the barons, and dreaded the confluence of a multitude who assumed the privilege of coming in arms to the appointed place. So inconvenient and mischievous a scheme could not long subsist among an advancing people; and, fortunately, the true remedy was discovered with little difficulty.

The principle of representation, in its widest sense can hardly be unknown to any government not purely democratical. The system of ecclesiastical councils, considered as organs of the church, rested upon the principle of a virtual or an express representation, and had a tendency to render its application to national assemblies more familiar.

SPELLING.

Coalition.
Adjustment.
Supplementary.
Derision.
Consecutive.
Cynicism.
Parasite.
Recreant.
Heir-apparent.
Monetary.
Chancellor.
Tenet.
Aggregate.
Automatic.
Chronology.
Readable.
Reminiscence.
Exchequer.
Epidemic.
Loathe.
Devastate.
Bi-metallic.
Cabal.
Instigate.

GRAMMAR.

I. (1) Give the principal parts of hit, abide, lie, spread, lay, burst, drown. (2) State the number (singular or plural) of strata, effluvia, vertebra, errata, nebula. (3) Give the plural of commander-in-chief, talisman, ephemeris, focus, genus, spoonful.

II. Correct the faults in the following, and explain the corrections: "Between you and I, I expect I hadn't ought to have done it. I ain't ashamed of it, though; because most everybody is afraid of those kind of things."

III. Parse the words in italics: *What* had become of *that* other ship *was* never *known*; but *it* was supposed *that* she had gone down with *all* on board. The *ship* that was saved was the *Seahorse.*

GEOGRAPHY.

I. In what part of what country, and on what water, are the following: 1. Tucson. 2. Metz. 3. Kiev. 4. Callao. 5. Monaco. Tell which, if any, are capitals.

II. Name the four provinces of Ireland, show their relative position, and name the principal seaport in each.

III. Bound Servia; bound Roumania. Where and what is Bulgaria?

IV. Name the three principal isthmuses upon which it is proposed to provide a means of communication between the Atlantic and Pacific Oceans, and name in each case the state to which the territory belongs. Name in order the states of Central America, stating on what water each has a coast line.

V. Describe the following rivers, telling where they rise, in what direction they flow, and into what water they empty: 1. Madeira. 2. Main. 3. Syr-Daria. 4. Brazos.

COURSE OF INSTRUCTION.

DEPARTMENT OF SEAMANSHIP.

SEAMANSHIP.*—Description of all kinds of rope, and its practical manipulation for all purposes on shipboard; measuring for and fitting standing and running rigging; masting, sparring, and rigging ship; getting on board and stowing a vessel's outfit; organizing a ship's company; the fittings of boats; the management of boats under all circumstances; evolutions of vessels at sea and in harbor; repair of spars and rigging in cases of accident; duties of officers at sea and in port; rules of the road; wind and weather.

Text-book.—Luce's Seamanship, with lectures and illustrations from models.

SHIP-BUILDING.

Text-books.—Thearle's Naval Architecture and Wilson's Ship-Building, with lectures illustrated by models and drawings.

NAVAL TACTICS.*—Organization, formations, and maneuvering of a fleet, under steam or sail.

Text-books.—Manual of Naval Tactics (Ward); Steam Fleet Tactics (Parker); United States Naval Signal-Book; Manual of Signals (Myer).

PRACTICAL EXERCISES, consisting of—

SEAMANSHIP-DRILLS.*—Exercises on shipboard with sails and spars.

NAVAL TACTICS.*—Exercises in boats under oars and under sails.

SIGNALS.—Exercises in the use of signals according to Myer's Army Signal Code.

PRACTICAL SEAMANSHIP.*—Exercises on board the United States sloop-of-war Dale on Saturday mornings.

The instruction in boxing, gymnastics, swimming, and dancing is in charge of this department.

DEPARTMENT OF ORDNANCE AND GUNNERY.

PRACTICE AND THEORY OF GUNNERY.*—*Practical naval gunnery*, as laid down in the Ordnance and Gunnery Instructions for the United States Navy.

Preparation of gun-iron from crude ore, including the description and use of furnaces; manufacture of wrought-iron, steel, and bronze; fabrication of guns of all descriptions; manufacture of gunpowder and fuses, and of all kinds of projectiles and fire-works.

Theory of gunnery.—Motion of projectiles *in vacuo* and in the atmosphere; initial, remaining, and final velocities, and the methods of determining their values; the effect of variations of charge, windage, and weight of projectiles; deviation of projectiles; the several systems of pointing; tangent sights and determination of their values; penetration and shock of projectiles; and recoil of guns.

Text-books.—Cooke's Naval Ordnance and Gunnery; Ordnance Instructions, United States Navy; Gunnery Instructions, United States Navy.

INFANTRY TACTICS.*—Organization and formation of squad, company, and battalion; school of the soldier; company and battalion drill, including instructions for skirmishers and the bayonet exercise.

Text-books.—United States Infantry Tactics; Wingate's Rifle Practice.

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* Cadet-Midshipmen only.

PRACTICAL EXERCISES, consisting of—

INFANTRY-DRILL.

FIELD-ARTILLERY AND BOAT-HOWITZER EXERCISE.

GREAT GUNS.—Exercises and target practice on board the United States ship Santee.

MORTAR-PRACTICE.

FENCING.—Exercises with small-swords and broadswords.

DEPARTMENT OF MATHEMATICS.

ALGEBRA.—Fundamental operations; reduction and conversion of fractional and surd quantities; involution and evolution; reduction and solution of equations of the first and second degrees; the summation of series; the nature, construction, and use of logarithms; the theory of equations.

GEOMETRY.—Plane and solid geometry; the mensuration of surfaces and volumes; he application of algebra to geometry.

TRIGONOMETRY.—Analytical investigation of trigonometric formulas, and their application to all the cases of plane and spherical trigonometry; the construction and use of trigonometric tables; the solution of trigonometric equations; trigonometric series.

ANALYTICAL GEOMETRY.—Equations of the right line, plane, and conic sections; discussion of the general equation of the second degree, involving two or three variables; determination of loci; principal problems relating to the cylinder, cone, sphere, and spheroids.

DESCRIPTIVE GEOMETRY.—The graphic illustration and solution of problems in solid geometry, and the application of the method, particularly to the projections of the sphere and to the construction of maps.

Text-books.—Ray's Higher Algebra;* Todhunter's Algebra for beginners;† Chauvenet's Geometry;* Wentworth's Geometry;† Chauvenet's Trigonometry; Church's Descriptive Geometry; Angell's Practical Geometry and Projections;* Todhunter's Conic Sections; Aldis' Solid Geometry;* Bowditch's Useful Tables.

ELECTIVE COURSES.

In addition to the above, Cadets of the third and fourth classes who display marked ability in mathematics are permitted to take an advanced course. The following are the elective courses for 1880–'81:

Fourth class.—Algebra, the theory of equations, and curve-tracing.

Third class.—The elements of the differential and integral calculus, with applications to trigonometry and to geometry of two dimensions.

Text-books.—Todhunter's Algebra for Colleges and Schools; Todhunter's Theory of Equations; Rice and Johnson's Elements of the Differential Calculus; Johnson's Integral Calculus.

DEPARTMENT OF STEAM-ENGINEERING.

MARINE ENGINES.—General theory of the steam-engine; classification and details of marine steam-engines, and of instruments and apparatus used in connection with them; the computation of the power and its cost; instruction in the duties of the engine-room watch and of the engineer division, by means of practical exercises on board the United States steamer Nantucket.

FABRICATION OF MACHINERY.*—The qualities and strength of materials, and the processes of manufacture, accompanied by practical exercises with the workshop methods and appliances for the conversion of the various materials into finished machinery.

DESIGNING OF MACHINERY.*—Pure mechanism, and the designing of boilers and engines, including valve-gears.

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*Cadet-Engineers only. †Cadet-Midshipmen only.

Mechanical drawing.†—The nomenclature of design; general and conventional practices of the art; the execution of plans, elevations, and sections; isometrical projections; shades, shadows, and linear perspective.

Practical exercises.—The management of marine steam apparatus; [the use of tools and machines; hand-work of the machine-shop, pattern-shop, smithery, boiler-shop, and foundry].†

Text-books.—Weisbach's Mechanics of Engineering, Vol. II;* Northcott's Steam-Engine;† Warren's Elements of Mechanical Drawing;† Goodeve's Elements of Mechanism;† Rankine's Machinery and Mill-Work;† Rankine's Steam-Engine and other Prime Movers;† Zeuner's Valve-Motion;† and Shelley's Workshop Appliances;† King's Lessons and Notes on the Steam-Engine; Shock's Treatise on Steam-Boilers.†

DEPARTMENT OF ASTRONOMY, NAVIGATION, AND SURVEYING.

Astronomy.—Descriptive and practical astronomy, including the use of instruments, especially those used for determining terrestrial latitudes and longitudes; the solution of the astronomical triangle; the use of the Nautical Almanac.*

Text-books.—C. J. White's Astronomy; Newcomb and Holden's Astronomy;* Theory of the portable Transit and the Zenith Telescope; Coffin's Navigation;* Bowditch's Navigator.*

Navigation.*—Theory and practice of navigation, the latter including instruction in the duties of the navigator, the use of navigating instruments, and their construction, with the solution of problems and the use of tables.

Text-books.—Coffin's Navigation;* Howell's Mathematical Theory of the Deviations of the Compass;* Bowditch's Navigator;* Howell's Marine Surveying.*

Surveying.*—The form of the earth, with special reference to the construction of charts; explanation of geodetical surveys; the solution of problems in nautical surveying, and practical work in surveying and constructing charts.

Text-book.—Howell's Marine Surveying.*

DEPARTMENT OF PHYSICS AND CHEMISTRY.

Acoustics.—Theory of waves; the production and propagation of sound; the numerical evaluation of sound; modes of vibration; communication of vibrations; analysis of vibrations.

Optics.—The propagation, reflection, and refraction of light; lenses, vision, and optical instruments; spectrum analysis; color; the undulatory theory of light; polarization and double refraction.

Electricity and magnetism.—Statical electricity; dynamical electricity; magnetism; electro-magnetism; electrical measurements; thermo-electricity; applications of electricity.

Chemistry.—General Chemistry.

Experimental lectures on physics and chemistry.

Heat.—Theories of heat; sources of heat; conduction, radiation, and convection; specific heat; effects of heat; instruments used for the measurement of heat; thermodynamics.

Physical measurements.†—In this course the Cadets are permitted to elect between work in the physical laboratory and work in the chemical laboratory.

The work in the physical laboratory during the year 1880 consisted in the calibration of two thermometers, and in the preparation of tables for the correction of the readings of these and several others; determination of the ratio of the arms of a chemical balance; determination of coefficient of torsion; determination of specific gravities; determination of the specific heat of various specimens of boiler scale, and an investigation of the thermal conductivity of boiler scale; measurement of the focal length of lenses, and the index of refraction of glass and of water containing different quantities of Na Cl in solution; photometric observations; experiments with the spectroscope, saccharimeter, and diffraction bank; measurements of the resistance of batteries of various forms and working under different conditions; comparison of the resistances of the various sets of resistance coils in the laboratory; determination and comparison of the constants of three tangent galvanometers; an investigation of the changes in electrical resistance of carbon due to changes in pressure.

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* Cadet-Midshipmen only. † Cadet-Engineers only.

The work in the chemical laboratory during the year 1879–'80 embraced blowpipe analysis; crystallography; mineralogy; quantitative analysis.

The course in mineralogy comprised the study in the mineral cabinet of the most commonly-recurring minerals, the useful ores, and the objectionable minerals which are frequently associated with them.

The course in quantitative analysis consisted of the gravimetric determination of—

Iron in ammonio-ferrous sulphate.

Lead, carbon dioxide, and insoluble residue in a white lead ground in oil.

Valuation of a coal.

The preparation and standardizing of a solution of potassic permanganate by means of iron wire, ammonio-ferrous sulphate, oxalic acid, and ammonic oxalate.

The estimation of iron in an iron salt and in hematite and magnetite ores by means of the permanganate solution.

Preparation and standardizing of a solution of potassic dichromate.

Estimation of iron in an iron salt by Penny's method.

Text-books.—Stewart's Elementary Physics; Eliot and Storer's Chemical Analysis; Jenkins's Magnetism and Electricity; Stewart's Elementary Treatise on Heat; Miller's Inorganic Chemistry; Kohlrausch's Physical Measurements; Nason and Chandler's Blowpipe Analysis; Dana's Manual of Mineralogy; Thorpe's Quantitative Chemical Analysis.

Cadet-Engineers of the first class have additional practical exercises in chemical analysis every Saturday morning, while the Cadet-Midshipmen exercise in seamanship.

DEPARTMENT OF MECHANICS AND APPLIED MATHEMATICS.

THE DIFFERENTIAL AND INTEGRAL CALCULUS.—The principles of the differential calculus, including Taylor's theorem, applications to problems of maxima and minima, and the tracing of curves; the methods of integration, and the application of the integral calculus to areas, surfaces, and volumes, and to finding centres of gravity and moments of inertia, and to simple cases of differential equations.

MECHANICS.—*Statics*, including the theory of friction, adhesion, and stiffness of cordage. *Dynamics*, including the motion of projectiles in a non-resisting medium and in air; motions of translation and of rotation of bodies about an axis; falling bodies; central forces; the simple and the compound pendulum; the laws of planetary motion; work and the conservation of energy.

HYDROSTATICS.—Mechanical properties of fluids; the laws of equilibrium and pressure; the flotation of bodies; the stability and oscillations of floating bodies; specific gravity; the motion of liquids. *Aëriform fluids.*—Laws of pressure; weight and pressure of the atmosphere; the barometer, the siphon, and the pump.

THE STRENGTH AND RESISTANCE OF MATERIALS.*—Simple and compound stresses; the relations between strain, stress, and resilience; the strength and stiffness of beams; beams of uniform resistance.

THE METHOD OF LEAST SQUARES.*—The theory of the method of least squares and the application of the method to results derived from experiments.

THEORETICAL NAVAL ARCHITECTURE.*

Text-books.—Rice and Johnson's Differential Calculus; Johnson's Integral Calculus; Todhunter's Mechanics for Beginners; Smith's Hydrostatics; Alexander's Applied Mechanics;* Rankine's Applied Mechanics;* Merriman's Method of Least Squares;* Thearle's Theoretical Naval Architecture.*

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*Cadet-Engineers only.

ELECTIVE COURSES.

Cadets who have completed the elective course in mathematics are permitted to take an advanced course in the integral calculus and in analytical mechanics.

The course in theoretical naval architecture is elective for Cadet-Midshipmen. There is also an elective course in theoretical naval architecture for Cadet-Engineers.

Text-books.—Williamson's Integral Calculus; Tait and Steele's Dynamics of a Particle; Thearle's Theoretical Naval Architecture; Lectures on the mathematical theory of naval architecture.

DEPARTMENT OF ENGLISH STUDIES, HISTORY, AND LAW.

LAW.—Constitution of the United States.—International law; rights and duties of nations in peace and war; rights of interference, of jurisdiction over the sea, of commerce, of passage over land and navigable rivers; duties of ministers, consuls, and naval commanders; kinds of property liable to capture; domicil; privateering; prizes; *jus postliminii;* rights and duties of neutrals; contraband; blockade; right of search; ship's papers; offenses against the law of nations.—Outlines of maritime law.

Text-books.—Woolsey's International Law; Andrew's Manual of the Constitution.

HISTORY.—Outlines of history, especially the history of Greece and Rome, and of the states of Western Europe down to 1880; historical geography; progress of colonial development in America; history of the United States; naval history; contemporary European and American history; lectures.

Text-books.—Freeman's General Sketch of History, with Labberton's Historical Atlas; Eliot's History of the United States, with modern atlases; the School Herald.

ENGLISH.—Historical development of the English language; changes wrought by foreign influence on the grammar, vocabulary, and pronunciation. Etymology. Syntax; analysis of sentences.—Readings from standard authors.—Rhetoric.—Themes.—Official dispatches.

Text-books—Hill's Rhetoric; Tancock's English Grammar and Reading Book; Hart's Manual of Punctuation.

DEPARTMENT OF MODERN LANGUAGES.

FRENCH.—Grammar; exercises in reading, writing, and conversation.

SPANISH.—The course in Spanish is elective.

Text-books.—Keetel's French Grammar; La Fontaine's Fables; Prud'homme's French Nautical Phrases; Erckmann-Chatrian's *Le Conscrit* and *Waterloo;* Gasc's Dictionary; Roget's Spanish Manual; Tolon's Reader; Barretti's Dictionary.

DEPARTMENT OF DRAWING.

Free-hand drawing and practical perspective; topographical and chart drawing.

The foregoing studies are distributed over four years, and the Cadets are arranged in four classes, each class pursuing the course for the corresponding year.

PROGRAMME OF RECITATIONS.

The time devoted to daily recitations is divided into three periods, indicated thus: (1), (2), (3). (1) denotes first period, from 8.16 a. m. to 10.16 a. m.; (2) denotes second period, from 10.31 a. m. to 12.35 p. m.; and (3) denotes third period, from 2 p. m. to 4 p. m.

Practical exercises begin on Saturdays at 10.45 a. m., and on other days, except Sundays, at 4.05 p. m.

FIRST TERM.

From October 1, 1881, *to January* 28, 1882.

CADET-MIDSHIPMEN.

Departments.	Periods.	Subjects.
	FOURTH CLASS.	
Mathematics	M. T. W. Th. F. (2) S. (1) . .	Algebra and geometry. Elective course once a week.
English Studies, History, and Law.	M. T. W. Th. F. (1) . . .	English and history.
Modern Languages . . .	First division, T. Th. (3) . . Second division, W. F. (3) .	Keetel's French Grammar.
Drawing	First division, W. F. (3) . . Second division, T. Th. (3) . M. (3)	Free-hand drawing.
	THIRD CLASS.	
Mathematics	M. T. W. Th. F. (1) . . .	Trigonometry and descriptive geometry. Elective course once a week.
	F. (3)	Descriptive geometry.
Physics and Chemistry . . .	W. (3)	Elementary physics and chemistry.
English Studies, History, and Law.	M. T. Th. (3)	English and history.
Modern Languages . . .	M. W. F. (2)	French and elective course in Spanish.
Drawing	T. Th. (2) S. (1)	Topography.
	SECOND CLASS.	
Seamanship	Th. (3)	Luce's Seamanship.
Ordnance and Gunnery . .	F. (3)	Infantry tactics and Ordnance Instructions.
Astronomy, Navigation, and Surveying	M. (2) T. (3) S. (1)	Astronomy.
Mechanics and Applied Mathematics	M. W. Th. F. (1) T. (2) . . .	Calculus. Elective course twice a week.
English Studies, History, and Law.	W. (2)	English and history.
Modern Languages . . .	M. (3) Th. (2)	French and elective course in Spanish.
Physics and Chemistry . . .	F. (2) W. (3) T. (1)	Chemistry and heat.
	FIRST CLASS.	
Seamanship	T. (3) F. (1)	Ship-building.
	M. (3) W. (2)	Luce's Seamanship.
Ordnance and Gunnery . . .	Th. S. (1) F. (2)	Ordnance and armor.
Steam-Engineering . . .	W. Th. F. (3)	Marine engines.
Astronomy, Navigation, and Surveying	M. T. W. (1)	Navigation.
Physics and Chemistry . . .	M. T. Th. (2)	Electricity.

CADET-ENGINEERS.

Departments.	Periods.	Subjects.
	FOURTH CLASS.	
Mathematics	M. T. W. Th. F. (2) S (1)	Algebra, geometry, and descriptive geometry. Elective course once a week.
Steam-Engineering	M. T. W. (3)	Mechanical drawing and fabrication.
English Studies, History, and Law.	M. T. W. Th. F. (1)	English and history.
Modern Languages	Th. F. (3)	Keetel's French Grammar.
	THIRD CLASS.	
Mathematics	M. T. W. Th. F. (1) W. (3)	Trigonometry and descriptive geometry. Elective course once a week. Descriptive geometry.
Steam-Engineering	T. Th. (2) F. (3) S. (1)	Mechanical drawing and fabrication.
English Studies, History, and Law.	M. T. Th. (3)	English and history.
Modern Languages	M. W. F. (2)	French and elective course in Spanish.
	SECOND CLASS.	
Steam-Engineering	M. (2) T. Th. F. (3)	Mechanical drawing and fabrication of machinery, and marine engines.
Mechanics and Applied Mathematics.	M. W. Th. F. (1) T. (2)	Calculus. Elective course twice a week.
English Studies, History, and Law.	W. (2)	English and history.
Modern Languages	M. (3) Th. (2)	French and elective course in Spanish.
Physics and Chemistry	F. (2) T. S. (1) W. (3)	Chemistry and heat.
	FIRST CLASS.	
Seamanship	T. (3) F. (1)	Ship-building.
Steam-Engineering	M. T. W. Th. S. (1) W. Th. F. (3)	Marine engines, fabrication, designing machinery, and mechanical drawing.
Physics and Chemistry	M. (3) T. Th. (2)	Electricity.
Mechanics and Applied Mathematics	M. W. F. (2)	Strength of materials.

SECOND TERM.

From January 30, 1882, *to June* 1, 1882.

CADET-MIDSHIPMEN.

Departments.	Periods.	Subjects.
	FOURTH CLASS.	
Mathematics	M. T. W. Th. F. (2) S. (1)	Algebra and geometry. Elective course once a week.
English Studies, History, and Law.	M. T. W. Th. F. (1)	English and history.
Modern Languages	First division, T. Th. (3) Second division, W. F. (3)	French.
Drawing	First division, W. F. (3) Second division, T. Th. (3) M. (3)	Free-hand drawing and topography.
	THIRD CLASS.	
Mathematics	M. T. W. Th. F. (1)	Analytical geometry. Elective course once a week.
	T. (3)	Descriptive geometry.
Physics and Chemistry	T. Th. F. (2) W. (3)	Elementary physics.
English Studies, History, and Law.	M. Th. (3) S. (1)	English and history.
Modern Languages	M. W. (2) F. (3)	French and elective course in Spanish.
	SECOND CLASS.	
Seamanship	W. F. (3)	Luce's Seamanship.
	Th. (2)	Naval tactics.
Ordnance and Gunnery	T. Th. (3)	Infantry tactics and Ordnance Instructions.
Astronomy, Navigation, and Surveying	F. (2) S. (1)	Astronomy.
Mechanics and Applied Mathematics	M. T. W. Th. F. (1)	Mechanics. Elective course twice a week.
English Studies, History, and Law.	One period a month	English composition.
Modern Languages	M. (3) T. (2)	French and elective course in Spanish.
Physics and Chemistry	M. W. (2)	Heat.
	FIRST CLASS.	
Seamanship	M. W. (2)	Luce's Seamanship.
Ordnance and Gunnery	W. (3) F. S. (1)	Ordnance and armor
Steam-Engineering	M. Th. (3) T. (2)	Marine engines.
Astronomy, Navigation, and Surveying	M. T. W. Th. (1)	Navigation and surveying.
Mechanics and Applied Mathematics	T. (2)	Elective course in naval architecture.
English Studies, History, and Law.	T. F. (3)	Public Law.
Modern Languages	Th. F. (2)	French and elective course in Spanish.

CADET-ENGINEERS.

Departments.	Periods.	Subjects.
	FOURTH CLASS.	
Mathematics	M. T. W. Th. F. (2) S. (1)	Algebra, geometry, and descriptive geometry. Elective course once a week.
	M. (3)	Descriptive geometry.
Steam-Engineering	W. F. (3)	Mechanical drawing and fabrication.
English Studies, History, and Law.	M. T. W. Th. F. (1)	English and history.
Modern Languages	T. Th. (3)	French and elective course in Spanish.
	THIRD CLASS.	
Mathematics	M. T. W. Th. F. (1)	Analytical and descriptive geometry. Elective course once a week.
	W. (3)	Descriptive geometry.
Steam-Engineering	T. (3)	Mechanical drawing and fabrication.
Physics and Chemistry	T. Th. F. (2)	Elementary physics.
English Studies, History, and Law.	M. Th. (3) S. (1)	English and history.
Modern Languages	M. W. (2) F. (3)	French and elective course in Spanish.
	SECOND CLASS.	
Steam-Engineering	T. W. (3) Th. F. (2) S. (1)	Mechanical drawing, fabrication of machinery, and marine engines.
Physics and Chemistry	M. W. (2)	Heat.
Mechanics and Applied Mathematics	M. T. W Th. F. (1)	Mechanics. Elective course twice a week.
English Studies, History, and Law.	One period a month	English composition.
Modern Languages	M. (3) T. (2)	French and elective course in Spanish.
Astronomy, Navigation, and Surveying	Th. F. (3)	Descriptive astronomy.
	FIRST CLASS.	
Steam-Engineering	M. T. W. Th. F. (1)	Marine engines, fabrication, designing machinery.
	T. (2) Th. (3)	Mechanical drawing.
Physics and Chemistry	M. W. (3)	Physical measurements.
Mechanics and Applied Mathematics	M. W. (2) S. (1)	The method of least squares. Naval architecture. Elective course in naval architecture.
English Studies, History, and Law	T. F. (3)	Public law.
Modern Languages	Th. F. (2)	French and elective course in Spanish.

EXAMINATION PAPERS—1880-81.

FOURTH CLASS.

DEPARTMENT OF MATHEMATICS.

ALGEBRA.

MONTHLY EXAMINATION.

CADET ENGINEERS.

NOVEMBER, 1880.—*Time allowed, two hours.*

1. What is a root of an equation? Prove that if $f(x)$ is divisible by $x-a$, then a is a root of $f(x)=0$. Show that $f(a)$ is the remainder obtained by dividing $f(x)$ by $x-a$. Denoting the roots of an equation by a, b, c, &c., find the coefficients of the equation in terms of the roots. Prove that imaginary roots occur in pairs. Find the value of $x^4-7x^3-6x^2-5x+4$, when $x=11$.

2. What is Descartes' rule of signs? Transform the equation $x^3-6x^2+9x-10=0$, whose roots are a, b, and c, (1) to another whose roots are $-a$, $-b$, $-c$; (2) to one whose roots are $\frac{1}{a}$, $\frac{1}{b}$, $\frac{1}{c}$; (3) to an equation of the form $x^3+qx+r=0$; (4) to an equation of the form $x^3+px^2+r=0$ (two results). Transform the equation

$$x^3+2x^2+\frac{x}{4}+\frac{1}{9}=0 \text{ to another with integral coefficients.}$$

3. Explain the method of transforming an equation to another whose roots are less by a given quantity. Determine the law of Derived Polynomials. Give a brief explanation of Horner's Method.

4. Find a root of $x^3-8x^2+23x-30=0$ to seven decimal places.

5. Solve the equation $x^3+qx+r=0$ (*i. e.*, apply the method of Cardan). Find the condition that $x^3+qx+r=0$ may have equal roots.

Solve the equation $ax^2+bx+c=0$. What is the condition that the roots may be equal? Solve the equation $x^4+4x^3-10x^2+4x+1=0$.

6. The roots of $x^3+qx+r=0$, being a, b, c; find the equation whose roots are $(a-b^2)$, $(a-c)^2$, $(b-c)^2$, and from the results find the condition that the given equation may have a pair of equal roots.

7. Prove that $f'(x)=f(x)\left\{\frac{1}{x-a}+\frac{1}{x-b}+\frac{1}{x-c}+\ \ldots\ldots\right\}$ and then show that if $x.f'(x)$ be divided by $f(x)$ the coefficients of the terms of the quotient taken in order will be n, S_1, S_2, S_3, &c., ... S_n, where S_n means the sum of the nth powers of the roots.

ALGEBRA.

CADET-MIDSHIPMEN.

JANUARY, 1881.—*Time allowed, four hours.*

1. Separate into factors a^3-x^3, a^3+x^3, x^2-6x+5, $32a^4+54ab^3-81b^4$, $a^2b^2+2\,abc^2-a^2c^2-b^2c^2$, $ax^2-ab^2+b^2x-x^3$ and $a^3+b^3+c^3-3abc$.

2. Find the greatest common divisor of $2x^4-12x^3+19x^2-6x+9$ and $4x^3-18x^2+19x-3$.

Separate $4a^2b^2-(a^2+b^2-c^2)^2$ into four factors.

3. Solve the equations $\frac{x-1}{x-2}-\frac{x-2}{x-3}=\frac{x-5}{x-6}-\frac{x-6}{x-7}$ and $\frac{x}{a}-\frac{x}{a-b}=\frac{a}{a+b}$.

4. Solve the equation $\frac{3abc}{a+b}+\frac{a^2b^2}{(a+b)^2}+\frac{(2a+b)b^2x}{a(a+b)}=3cx+\frac{bx}{a}$.

5. Solve the equations $\frac{n}{x}+\frac{m}{y}=1$, $\frac{m}{x}+\frac{n}{y}=1$

and $ax-by=c(a-b)$, $\frac{x}{b+c}+\frac{y}{a+c}=2$.

6. Find the cube root of 7190 to seven decimal places.

7. Find the square root of $4+2\sqrt{3}$ and of $16+5\sqrt{7}$.

Simplify $\sqrt{\frac{2-\sqrt{3}}{2+\sqrt{3}}}$. Solve the equation $\sqrt{x+a}+\sqrt{x+b}=\sqrt{c}$.

8. Solve the equations $110x^2-21x+1=0$ and $2\sqrt{3x+7}=9+\sqrt{2x-3}$.

9. Develop $(3a-2b)^5$ and find five terms of the expansion of $(a^5-x^5)^{-\frac{3}{5}}$.

10. Solve the equations

$\sqrt{x^2+ax+b^2}+\sqrt{x^2+bx+a^2}=a+b$ and $ax+2\sqrt{n^2x+nax^2}=(3x-1)n$.

11. Solve $\left(x-\frac{ab}{x}\right)^2=\frac{a}{2}(a+b)\left(1+\frac{a^2}{x^2}\right)$.

12. Find limits to the real values of x and y which can satisfy the equation

$$x^2+12xy+4y^2+4x+8y+20=0.$$

ALGEBRA.

CADET-ENGINEERS.

JUNE, 1881.—*Time allowed, four hours.*

1. Deduce formulas by which we may find the nth term and the sum of n terms of the series $a+b+c+d+$, &c. Apply the method to find the number of shot in a pyramidal pile with triangular base, side m.

2. Find the sum of the series $1^3+2^3+3^3+\ldots n^3$ by means of indeterminate coefficients. Find the sum of the series $\frac{1}{1.5}+\frac{1}{2.6}+\frac{1}{3.7}+$ &c., *ad infinitum.*

3. Express 3.1416 as a continued fraction and find four convergents—find also how much the last convergent differs from 3.1416. Express $2+\sqrt{3}$ as a periodic continued fraction, and find the value of the periodic fraction $3+\frac{1}{1+}\,\frac{1}{2+}\,\frac{1}{3+}\,\frac{1}{4+}\,\frac{1}{1+}$ &c.

4. Define a logarithm. Prove that $\log_a b \log_b a = 1$. What is the modulus of a system of logarithms? Find the modulus of a system whose base is 7. Find the value of the expression, $\left\{\frac{a^3.\,b^2.\,c.\,d^{\frac{1}{3}}}{e.\,f^3.\,g^2}\right\}^{\frac{1}{11}}$; given a, 37.715; b, .0066182; c, .48425; d, .000098123; e, 24.876; f, 157.12; g, 34.256.

5. Find the values of x and y from the equations $y^2=ax^2+cx$ and $y=mx+b$. Denoting these values by x_1, x_2, y_1 and y_2, show that $(x_1+x_2)=\frac{c-2bm}{m^2-a}$ and $(y_1+y_2)=\frac{mc-2ab}{m^2-a}$. Let $h=\frac{1}{2}(x_1+x_2)$ and $k=\frac{1}{2}(y_1+y_2)$; then show (by eliminating b) that $2ah-2mk+c=o$.

6. Show that the expression $(x^2+y^2+z^2+c^2-a^2)^2-4c^2(x^2+y^2)$ can be separated into two quadratic factors (1) if $z=o$, (2) if $x=o$, (3) if $z=\frac{a\,x}{\sqrt{c^2-a^2}}$, and find the factors in each case.

7. Find the value of x^y, when $x=.0062845$, $y=.00038132$. Find the value of x^P where $P=x^Q$, $Q=x^R$, $R=x^S$ and so on *ad infininitum*, given $x=.1$.

GEOMETRY.

CADET-MIDSHIPMEN.

JUNE, 1881.—*Time allowed, four hours.*

1. Prove that in any polygon the exterior angles made by producing each of the sides in succession are together equal to four right angles. Prove that the three perpendiculars let fall from the vertices of a triangle upon the opposite sides meet in a point.

2. Show how to inscribe a circle in a given triangle (give the proof). Upon a given straight line describe a segment which shall contain a given angle. Construct a triangle, given two sides and an angle opposite one of them; discuss the cases that may occur.

3. Prove, geometrically, that the square described upon the hypothenuse of a right triangle is equivalent to the sum of the squares described upon the other sides. Would the proposition be true if for *square* we substituted *equilateral triangle*, or circle described upon the side as diameter? Give reasons for your answer.

4. Prove that if, from a point without a circle, a secant and a tangent be drawn, the tangent is a mean proportional between the whole secant and the part without the circle. Construct a mean proportional between two given lines; divide a given line in extreme and mean ratio. Give reasons for the construction in each case.

5. Prove that a triangular pyramid is one-third of the prism of the same base and altitude. Deduce the formula for the volume of the frustum of a triangular pyramid.

6. Deduce the formula for the area of a plane triangle in terms of the sides, and find a similar expression for the radius of the inscribed circle.

7. Find the length of a side and the area of each of the following regular polygons inscribed in a circle, radius a; square, equilateral triangle, hexagon, octagon, decagon, and dodecagon.

8. A rectangular parallelopiped has a square base, side a; on three consecutive edges distances b, c, d, respectively, are laid off (measuring from the base), and a plane is passed through the three points so determined. Find the distance from the base at which the plane cuts the other edge, and the volume of the truncated prism.

DESCRIPTIVE GEOMETRY.

CADET-ENGINEERS.

JUNE, 1881.—*Time allowed, four hours.*

Give full explanations of all constructions.

1. Determine the projections of a line which shall contain a given point, and make given angles α and β with the planes of projection. Find the traces of a plane which contains a given point and is inclined at angles α and β to H and V.

2. Given the three faces of a trihedral angle, find the three dihedral angles. Given two faces of a trihedral angle and a dihedral angle opposite one of them, find the third face and the other dihedral angles.

3. Find the traces of a plane which contains a given line and is inclined at a given angle to H. Find the traces of a plane which contains a given line and makes a given angle with a given plane.

4. Through a given line draw a tangent plane to a sphere. Find the vertex of a cone which shall envelop two given spheres.

5. Find the projections and true form of a right section of an oblique cylinder, base circular, radius $1''.5$, elements oblique to H and V.

6. A sphere $2''$ in diameter has its centre $3''$ above H, the axis of a cylinder enveloping the sphere is inclined 45° to H. Find the projections of the line of contact, and the horizontal trace of the cylinder.

7. A cylinder stands on H; the base is a circle, radius $1''.25$, centre $2''$ in front of V. The elements are parallel to V and inclined 45° to H, and the altitude of the cylinder

is 4″. A sphere, radius 2″, has its centre at the middle point of that element of the cylinder which is nearest to *V*. It is required to find the projections of the cylinder as it appears after the portion common to the two surfaces has been removed, and to draw a tangent to the curve of intersection.

CURVE TRACING (ELECTIVE).

JUNE, 1881.—*Time allowed, four hours.*

CADET-ENGINEERS—*C. M. Knepper, W. L. Capps, Milton Dargan, A. L. Hughes, C. C. Baron, C. H. Hewes, R. O. Crisp, A. P. Biddle, F. K. Hill, H. E. Parmenter, and W. O. Hulme.*

CADET-MIDSHIPMEN—*C. P. Plunkett, N. S. Moseley, A. N. Beecher, J. S. McKean, and W. E. Cook.*

1. Trace the locus of the equation $4y^2-4xy+2x^2+4y-10x-12=0$.

2. Trace the loci of the equations,

$$3y^2-4xy+x^2-12y+4x+9=0 \text{ and } xy+3x-6y=0.$$

3. Trace the loci of the equations $x^2-4y=6x-y^2$ and $(2y-x+2)^2=6-x$.

4. Sketch the loci of the equations $y=x^3$, $x^2=-y^3$, and $y^3=x^4$, and trace the locus of $x^3-y^3-x^2+2y^2=0$.

5. Given the equation $(y-x)(y+x)(y+3x)=8xy$, find the asymptotes, the points where the curve crosses them, and trace the locus.

6. Prove that the expression $\dfrac{ax^2+bx+c}{cx^2+bx+a}$ is capable of all values whatever, if $b^2>(a+c)^2$; that there will be two values between which it cannot lie if $b^2<(a+c)^2$ and $>4ac$; and two values between which it must lie if $b^2<4ac$.

7. Draw the locus of $y=\dfrac{ax^2+bx+c}{cx^2+bx+a}$ to illustrate the three cases of the preceding question.

DEPARTMENT OF ENGLISH STUDIES, HISTORY, AND LAW.

HISTORY.

MONTHLY EXAMINATION.

DECEMBER, 1880.—*Time allowed, two hours.*

I. Give some account of (1) Simon of Montfort, (2) William the Silent, (3) Henry of Navarre, (4) Maximilian I.

II. Give an account of the German Reformation, 1517–1555.

III. 1453 and 1492. Connect these two dates, pointing out the relation between the two events, and giving, in your own words, your opinion of the significance of these events in European history.

IV. (1) Peace of Bretigny; (2) Treaty of Troyes. Give the date of each, the important battles (with dates) in the war preceding each treaty, and state and explain the provisions of each.

V. State briefly, in chronological order, the leading points in the wars of Louis XIV.

VI. (1) Dates, causes, sides, and leaders in the Thirty Years' War. (2) Give the name of the treaty that closed the war, and state the provisions of this treaty as to (*a*) Germany, (*b*) Switzerland, (*c*) the United Provinces, (*d*) France, (*e*) Sweden.

VII. (1) Show by a genealogical table how Charles V obtained the different parts of his dominions, and (2) draw a map of the same, putting down the boundaries of the principal divisions, and the position of—

1. Milan.
2. Augsburg.
3. Pisa.
4. Trent.
5. Ravenna.
6. Ratisbon.
7. Utrecht.
8. Sempach.
9. Lützen.
10. Pavia.
11. Strassburg.
12. Po River.
13. Marignano.
14. Rhine River.
15. Speyer (Spires).
16. Bologna.
17. Danube River.
18. Elbe River.

ENGLISH AND HISTORY.

JANUARY, 1881.—*Time allowed, four hours.*

N. B.—Starred questions are alternatives.

A.—HISTORY.

I. Explain the origin and meaning of the following terms: 1. Arian. 2. Aryan. 3. Languedoc. 4. Emperor. 5. Feudal tenures. 6. Protestant. 7. Romance languages. 8. Pragmatic sanction.—*Take five.*

II. 1. "At the moment that Greece began to lose her political freedom she made an intellectual conquest of a large part of the world." Tell what this means, and show how the two changes were brought about. 2. Explain the nature and foundation of political freedom in Greece. 3. Where was Mantineia, and why is it celebrated in Greek history?

II.* 1. Show that the later Roman republic was nominally a democracy, but with aristocratic tendencies. 2. What was the nature of the changes made by Augustus in the government of the Roman state?

III. What nation made the first conquest of what is now known as England? the second? the third? the fourth and last? Describe the influence upon the country of each of these conquests, giving dates.

IV. 1. State what important facts in English history are indicated by the following groups of dates, and explain briefly the importance of the facts: 1215, 1265; 1603, 1707, 1782, 1801; 1649, 1660. 2. "The Scots gained their liberty, and the establishment of their religion, by the same revolution that enslaved Ireland." Explain fully.

IV.* During the XVI. century there was a long rivalry between France and Spain, which was in some sort a continuation of the dispute between the houses of Anjou and Aragon for the kingdom of Sicily, as that had been a continuation of the older dispute between the Guelfs and Ghibelins." Explain fully all the allusions, tracing the connection between the parties to the different controversies.

V. "A new German power came to the front in Germany and it has gradually grown to be the head of Germany, much in the same way as Wessex grew in England, Castile in Spain, and France in Gaul. But its rise did not, like the rise of Russia, bring a race and religion from the background to the front." Describe briefly the facts referred to in the various allusions in the above passage, with a fuller statement of the peculiar features of the rise of Russia. Give dates in explaining the allusions.

V.* "For the very reason that the French kings had once had much less power than either the emperors or the English kings, they came in the end to have more power than either of them." Explain fully, showing what effect the feudal system had upon popular assemblies in the different states of Europe.

VI. Draw a map of Europe west of the meridian of Vienna, after the peace of Utrecht, marking the boundaries of France, Spain, Portugal, Savoy, Naples, Switzerland, United Provinces, Palatinate, and the following places: 1. Aachen. 3. Gibraltar. 3. Dunkirk. 4. Bern. 5. Nimwegen. 6. Besançon. 7. Avignon. 8. Strassburg. 9. Genoa. 10. Utrecht. 11. Nantes. 12. Basel.

B.—ENGLISH.

VII. (1) Give the subdivisions of the family of languages to which English belongs, and name the members of the group most nearly related to it. (2) Name the foreign elements in English, in the order in which their influence was exerted. (3) Explain the terms: (*a*) Welsh; (*b*) Briton; (*c*) Norman conquest; (*d*) analytic and synthetic conditions of language.

VIII. Analyze: I could never believe that Providence had sent a few men into the world, ready booted and spurred to ride, and millions ready saddled and bridled to be ridden.

IX.

She walks the *waters like* a *thing* of life
And seems *to dare* the elements to strife:
Who would not *brave* the *battle* fire, the wreck,
To move the *monarch* of the *peopled* deck?

Explain syntactically the words in italics.

X. The *virtues* of *sovereigns* are such as *tend* to the *maintenance* of peace at *home*, and to the *resistance* of *foreign enemies*.

Explain the etymology of the words in italics. Show that the spelling of the words *sovereign* and *foreign* is artificial.

HISTORY.

APRIL, 1881.—*Time allowed, two hours.*

1. Give a brief statement of the measures adopted at the beginning of Washington's administration: (1) to provide a revenue; (2) to strengthen the public credit.

2. When and how did the Federalists lose control of the government? State the circumstances connected with this event, and the political doctrines advocated by the different parties.

3. Give a brief account of any two of the following: 1. Embargo of 1807. 2. Louisiana purchase. 3. British operations about the Chesapeake in 1814.

4. (*a*) Name the two Senators who took the leading part in the discussion of State rights in 1830, telling from what State each one came, and what doctrine each advocated. (*b*) Who was the author of the Monroe doctrine, and when was it first promulgated? Who was the British foreign secretary at the time, and who was the American minister at London? What was the position of the United States toward the revolting Spanish colonies at this time?

5. What was the geographical line fixed by the Missouri compromise? In what territory was slavery prohibited by this compromise? What two States were admitted at this time? What was the question that arose in the Constitutional convention, in regard to considering slaves in the apportionment of representation, and how was it settled?

HISTORY.

MAY, 1881.—*Time allowed, four hours.*

1. Explain the Monroe doctrine; state when, by whom, and in what state-paper it was first laid down, and show how far it influenced American politics.

2. What is a representative assembly? What was the first representative assembly in America? What was the general character of the assemblies in the colonies? Describe the government of Plymouth colony.

3. Four colonial wars: dates, causes, corresponding wars in Europe, treaties.

4. State briefly the political views or leanings of any six of the following, illustrating by their action in reference to important measures: Washington, Hamilton, Jefferson, John Adams, Jay, Calhoun, Clay, J. Q. Adams, Jackson, Webster, Sumner, Douglas.

5. Name the successive Presidents, with the date of the beginning of each administration. Refer the following to the administrations in which they occurred: 1. Webster-Ashburton treaty. 2. Ostend manifesto. 3. Louisiana purchase. 4. Alabama arbitration. 5. Treaty of Guadalupe Hidalgo.

6. Explain the points at issue in 1844, as to the annexation of Texas, and show how, and with what results, the question was brought into the Presidential campaign of that year.

7. Name the successive commanders of the Army of the Potomac from 1861 to 1865, and state the decisive events during the campaigns of each.

8. State in exact language the terms of the Missouri compromise. How were the boundaries or territories of the United States altered in 1803? in 1819–'21? in 1845? in

1848? in 1853? in 1867? State exactly the boundaries of each acquisition, and the terms upon which it was made.

9. What was the Milan decree? Who composed the two missions sent to France by President John Adams? Which mission succeeded, and which failed? What were the two illegal powers assumed by Genet? Who succeeded Genet? On what condition did Georgia cede her western lands?

10. Give an exact account of Greene's campaign in South Carolina during the Revolution.

RHETORIC.

MONTHLY EXAMINATION.

FEBRUARY, 1881.—*Time allowed, two hours.*

I. (1) Explain fully the distinction between *shall* and *will*, giving original examples. (2) Name and explain fully the three elements or tests of good use in language. (3) Distinguish between *falsity* and *falseness; continual* and *continuous; observation* and *observance*, giving original examples.

Point out the faults in the following passages, show why they are faults, and correct them. In correcting the sentences, make only such changes as are necessary to reduce the phrase to good English.

II. Between you and I, I was lead to take this view by seeing some illy-disposed individuals who I was acquainted with, who didn't feel as though they would be willing to step out and knock the thing on the head. I reckoned that they was trying to inaugurate a new system, different than what we had been used to, and I expect I was about right.

III. The city don't want that much ground given up for a park. It was quite a common saying that it should be found that it would need it for other purposes; and yet most all persons would of guessed it would be more preferable to have it, on account of the public health. These sort of measures have been tried considerable before this, but the canaille antagonizes them.

IV. I confess I ain't much inclined to predicate anything about it. I don't know as it shall be possible to readily find a person anywheres which will ventilate the job and speak plain about it. I am as ready, indeed I am more so than my neighbors, who make a superficial show of public spirit, but each of them, when it comes to the point, think they demean themselves by having a decisive opinion, and in which they really believe.

RHETORIC.

MONTHLY EXAMINATION.

MARCH, 1881.—*Time allowed, two hours.*

1. Discuss the comparative advantages of general and specific terms, in reference to clearness of style.

2. Name and explain, with original illustrations, the various forms of figurative expression.

3. Explain the relative importance of clearness, precision, and force, under different circumstances, and in different kinds of composition.

4. Correct faults and explain corrections: The windings of the San Juan River makes it quite doubtful whether it shall be built with money which it is claimed will be sufficient for it; the enormity of the work, and the climate, subject to extremities of rain and drought, are arguments against it which will be destructive of the canal when the constructing of it commences.

5. Correct and point out the faults: It must be the political policy of the United States to dispel the clouds of ignorance that has been brought over by tides of immi-

gration since she made her début in the galaxy of nations; and then the wide expanse of American intelligence shall deepen into a profound ocean of intelligence, far eclipsing European knowledge, which will know no limits.

6. (Extra question). Explain the term *fallacies of confusion.* Show that a variety of meanings in a word may produce such fallacies, illustrating the statement by the words *theory* and *money*, as discussed by Mill.

RHETORIC.

MONTHLY EXAMINATION.

APRIL, 1881.—*Time allowed, two hours.*

1. Explain what is meant by *movement* in narrative. Why is it said of painting and writing, that "each is strongest at the other's weakest point"? What methods may be employed to give in writing suggestive descriptions of things, places, and persons.
2. Give Blair's rules for unity.
3. Discuss loose and periodic sentences; short and long sentences; particles at the end of a sentence.
4. Explain the difference between a term and a proposition, and show why one is a better subject for composition than the other.
5. Explain induction, deduction, reductio ad absurdum, giving original illustrations. What do you understand by *logic?*
6. Explain circumlocution, its sources, and its advantages and disadvantages.
7. Explain antithesis; point out its advantages, and show the effect of using it to excess. What can you say of balanced sentences?
8. Discuss the theories of Bentham and Herbert Spencer in regard to the order of words.

RHETORIC.

MAY, 1881.—*Time allowed, four hours.*

1. Name and define the three classes of offenses against correctness of usage. Give three divisions under the head of each class, explain them, and give an original example of each.

1.* What do you mean by saying that a writer has a "large vocabulary"? What can you say of Shakspere in this respect? of Milton? What are the advantages of a copious vocabulary? What is the best way to secure it? Name and explain the three principal qualities to be sought after in the choice of words.

2. What is meant by saying that *movement* and *method* are "the life and the logic of discourse? What are the peculiar advantages of method? "A writer should try to reach the imagination or the feelings by means peculiar to his art." Explain the three ways in which this may be successfully done, in narrative or description, and the advantages of each.

2.* Explain *burden of proof, presumption, presumption of law, counter-presumption.* What is meant by saying that a presumption is "an avowedly imperfect generalization"? State fully the advantage, in argument, of having the presumption on your side, and give illustrations of common presumptions.

3. Explain analogy, arguments from analogy. Show how to test the force of an argument from analogy. Show how a false analogy may be made the basis of an argument, and illustrate from the use of the phrase "paternal government."

4. Explain syllogism, argument from antecedent probability, begging the question. Point out the necessity of expert testimony, and its dangers.

5. What are *tropes?* What quality of style is secured by their use? Why? Explain the relation between metaphor and simile. "Personification is dangerously easy in English." Why is it easy, and why is it dangerous?

5.* Distinguish between *womanly* and *womanish; purpose* and *proposal; definite* and *definitive; statesman* and *politician.* Explain briefly and illustrate the correct and the incorrect use of *quite, transpire, inaugurate, confess.*

Point out and name the faults in the following, correct them, and explain the corrections:

6. Between you and I, I expect the Colonel had such firmness and resolution, which would most always have carried him through considerable of a difficulty; but an individual wants more than firmness when he is engaged in these kind of things. In short, he needs a different character than that of the Colonel; and though he tried most incessantly to correct himself, it seems like he was unable to change his nature. He was far from a man of exceptionable will.

7. The enfeebled animal stumbled, and the occupant of the team was thrown down, and precipitated to the pavement. Immediately he touched the stony surface some parties, standing around, and who commenced to politely offer their services, found he had broke his leg, together with some bruises; and so, after he had raised up, he laid down on a bench for a spell. After that, he thought he could walk as well as you or me.

8. The red, white, and blue pennants are carried by flag-officers, in the different grades of command, but neither merchantmen or fishing-smacks carry them.

Making a virtue of necessity, the question will be brought to a vote on Tuesday. I think I will be present; I want to see who it is opposed by. You shall probably vote according to your inclinations.

DEPARTMENT OF MODERN LANGUAGES.

FRENCH.

JUNE, 1881.—*Time allowed, three hours.*

Translate into French:

ANNAPOLIS, *June* 2, 1881.

MY DEAR FRIEND:

1. I owe you a letter, and I am going to write it in French.
2. I have been now one year at the Naval Academy.
3. It has been a continual labor, a continual occupation.
4. Here, one must work hard to succeed.
5. There are from two to three hundred cadets at the school.
6. There are also a great many officers; they are our instructors.
7. They live with their wives and children in fine brick houses covered with slate.
8. On Saturdays we have permission to go out in town.
9. Annapolis is not the most populous or the most commercial city in America; but it is a pretty little town.
10. There is a railroad from here to Baltimore and Washington; there are also one or two lines of steamboats.
11. We often watch them as they sail away on the beautiful Chesapeake Bay.
12. It has been a very cold winter, and the snow remained on the ground for more than two months.
13. Nevertheless, we have had many amusements, and I have danced a great deal at the balls and hops.
14 I am stronger than I used to be, and I have grown since you saw me.
15. Our fare is wholesome, and plentiful, and if our appetites are not good, it is not for want of exercise.
16. We leave in a fortnight to go on a cruise for the summer, and I shall not see you again before next September.
17. Adieu! or rather au revoir!

Your devoted friend,

L'ARTISAN ET LE MATELOT.

Un artisan demanda une fois à un matelot où était mort son père. Celui-ci répondit que son père, son grand-père et son bisaïeul étaient tous morts en mer.

"Eh bien!" dit l'autre, "n'avez-vous donc point peur d'aller en mer?"

"Pas le moins du monde," répondit le matelot. "Mais à votre tour dites-moi, je vous prie, où sont morts votre père, votre grand-père et votre bisaïeul?"

"Ils sont morts dans leurs lits," dit l'autre.

"A merveille," reprit le matelot, "mais alors pourquoi aurais-je plus peur d'aller sur mer, que vous d'aller vous coucher?"

GRAMMAR.

1. How many genders are there in French? Name them.
2. How is the gender of nouns denoting living things determined?
3. Is there more than one article?
4. When is the article to be repeated?
5. Give the personal pronouns used as subjects.
6. Where are they placed in interrogative sentences?
7. What is the place of 'ne—pas?'
8. Give the possessive adjectives, with their masculine, feminine, and plural forms.
9. As a general rule, how is the plural of nouns formed?
10. How do you form the plural of nouns ending in *au*, *eu*, and *al?*
11. A sentence being interrogative and the subject a noun, how is the sentence construed?
12. How many kinds of limiting adjectives are there? Name them.
13. With what do the possessive adjectives agree?
14. When is the form of the demonstrative adjective *ce* used, and when *cet?*
15. How many classes of verbs are there in French?
16. How many participles are there in French? What are the endings of the infinitive for all verbs?
17. When is the form *est-ce que* obligatory?
18. How is the object of a transitive verb called?
19. Give in a table—
    - (*a*) The second person, singular and plural, of the indicative.
    - (*b*) The third person, singular and plural, of the imperfect.
    - (*c*) The first person, singular and plural, of the future.
    - (*d*) The second person, singular and plural, of the present of the subjunctive of *avoir*, *être*, *couper*, *aller*, and *envoyer*.

SPANISH (ELECTIVE).

JUNE, 1881.—*Time allowed, four hours.*

Cadet-Engineers A. P. Biddle, W. L. Capps, and L. A. Wedderburn.

Translate into French:

ACCION HEROICA.

Un capitan holandes, llamado Schaeffelar, defendia con su gente la fortaleza de Barnevelt. El enemigo sitió la plaza, y exigió su rendicion; pero Schaeffelar se negó á capitular ántes de que la brecha se hubiese abierto. El primer artículo de la capitulacion exigia que el comandante de los sitiados fuese precipitado por ellos desde lo alto del torreon. Esta bárbara condicion los indignó, y juraron ántes morir que ceder á semejante exigencia. Pero el generoso Schaeffelar, al oir tan noble resolucion, y al considerar el peligro á que ella los exponia, subio rápidamente á lo mas alto del torreon, y les dijo: "Amigos mios, es preciso que yo muera un dia, y jamas se presentará otra ocasion como esta para morir gloriosamente, ya que mi muerte salva la vida de mis comarades." Dijo, y en presencia de sus soldados atónitos, se precipitó de lo alto del torreon.

Translate into Spanish:

HÉROÏSME.

Un jour que le roi Charles XII, assiégé dans Stralsund, dictait des lettres pour la Suède à un secrétaire, une bombe tomba sur la maison, perça le toit, et vint éclater près de la chambre même du roi. Au bruit de la bombe et au fracas de la maison qui semblait tomber, la plume échappa des mains du secrétaire: "Qu'y a-t-il donc?" lui dit le roi d'un air tranquille, "pourquoi n'ecrivez-vous pas?" Celui-ci ne put répondre que ces mots: "Eh, sire, la bombe!" "Eh bien," reprit le roi, "qu'a de commun la bombe avec la lettre que je vous dicte? Continuez."

THIRD CLASS.

DEPARTMENT OF SEAMANSHIP.

SEAMANSHIP.

CADET-MIDSHIPMEN.

June, 1881.—*Time allowed, four hours.*

1. Name the different kinds of blocks in common use on board ship, and state the difference between a mall block and a morticed block.
2. Describe in general terms a tackle and its uses. Give a particular description and explain the use of the luff tackle, burton, garnet and relieving tackles.
3. Describe a patent dead-eye, and explain the method of setting up rigging when this dead-eye is used.
4. Make a drawing of a topsail-yard showing all its parts and rigging complete.
5. Make up a course for bending, and bend it.
6. Describe the different methods of marking chain cables, and state how they are on board and stowed.

DEPARTMENT OF MATHEMATICS.

TRIGONOMETRY.

January, 1881.—*Time allowed, four and a half hours.*

1. Find the circular measure of $\tan^{-1}\sqrt{2}$. Find the degrees, minutes, and seconds in the arc whose circular measure is π^{ε}. Take from the tables the logarithms of the following functions: cotan 89° 37′ 45″, sec 88° 30′ 30″, cosec 165° 30′ 30″, sin 203° 5′ 18″ and cotan 269° 44′ 48″. Find the log ver sin of 187° 15′.
2. Deduce the formulas necessary to solve a right triangle when one side is very nearly equal to the hypothenuse. Find the distance at which a light can be seen, the height of the light above the sea level being 169 feet. (Earth's radius 4,000 statute miles). Give answer (1) in statute miles, (2) in geographical miles.
3. In a plane triangle given A, 69° 30′ 30″; b, 373.65; c, 281.42; solve the triangle and find its area. Deduce the necessary formulas.
4. Given t, 31° 13′; d, 15° 12′ S.; h, 57° 11′; find L and Z. Given A, 31° 13′; b, 105° 12′; a, 32° 49′; find c and B.
5. Given t, 40° 10′; d, 18° 20′ N.; L, 40° 35′ N.; find h and Z. Given A, 40° 10′; b, 71° 40′; c, 49° 25′; find a and B.
6. Given A, 139° 38′ 45″; B, 42° 33′ 30″; c, 129° 21′ 15″; solve the triangle.
7. The height of a ship's mast is 169 feet and the length of the top-gallant mast is 50 feet; the angle between the truck and the water-line is measured from a boat and found to be 10′ 30″. Find (1) the distance of the ship in statute miles; (2) the angle subtended by the top-gallant mast; the last result to be correct to tenths of seconds.

8. Find x from the equation $\cot^{-1}x+\cot^{-1}(n^2-x+1)=\cot^{-1}(n-1)$ and prove that $\cos^2\theta+\cos^2(a+\theta)-2\cos a\cos\theta\cos(a+\theta)$ is not a function of θ.

9. Prove that the value of $\dfrac{\tan(x+a)}{\tan(x-a)}$ lies between $\dfrac{1+\sin 2a}{1-\sin 2a}$ and $\dfrac{1-\sin 2a}{1+\sin 2a}$ for all possible values of x; and solve the equation $\sin 2x+\cos 2x+\sin x-\cos x=0$.

10. A quadrilateral is inscribed in a circle, radius 10: three of its sides are 8, 9, and 11; find the fourth side and the angles and area of the quadrilateral.

ANALYTICAL GEOMETRY.

Cadet-Engineers.

MONTHLY EXAMINATION.

April, 1881.—*Time allowed, two hours.*

1. Given the general equation $ax^2+bxy+cy^2+dx+ey+f=0$, in which b^2-4ac is not 0: find (h, k), the co-ordinates of the centre, and find what the equation becomes when the origin is moved to (h, k). Show how the equation is finally reduced to $Ax^2+By^2+F=0$, and find A and B in terms of a, b, and c.

2. Show that, however the axes may be situated, $b^2-4ac=b_1^2-4a_1c_1$ and $a+c=a_1+c_1$. Show how the reduction of the general equation is effected when $b^2=4ac$. Reduce $(y-x)^2+4x+8y=0$ to the form $y^2=Px$.

3. State what is represented by each of the following equations (give the work or reasons for the statement in each case): (*a.*) $y^2-4ax=4ay-x^2$,

(*b.*) $x^2-2xy+y^2+5ax-5ay+6a^2=0$, (*c.*) $(x-y)^2+5a(x+y)=0$,

(*d.*) $y^2-2xy+x^2+5ax-5ay+\dfrac{25a^2}{4}=0$; (*e.*) $xy+4ax+5ay+6a^2=0$,

(*f.*) $(x-3y)(x-2y)=3ax$, (*g.*) $2x^2+xy-y^2-5x+7y-12=0$,

(*h.*) $3x^2+2xy+3y^2+8ax+8ay+10a^2=0$.

4. Reduce the following equations to the form $Ax^2+By^2+F=0$: (*a.*) $5x^2+3xy+y^2+4x-y-9=0$; (*b.*) $5y^2+12xy+36x+6y-39=0$. Trace the locus of the latter as it stands.

5. Find the equations to the tangent and normal to $ax^2+bxy+cy^2+dx+ey+f=0$. Trace the loci of the equations $4x^2+y^2-4xy-24x+22y+61=0$ and

$$2y^2-2xy+x^2-4x+16y+32=0.$$

6. Find the equation to a plane whose traces are $z=m(x-h)$, $y=n(x-h)$. A parabola revolves about its directrix: find the equation to the surface generated. Investigate the character of the section of the surface by a doubly tangent plane.

7. Find the equation to a ring, distance from the axis to the centre of generating circle, a, radius of generating circle, b. Find the equation to a plane perpendicular to V and doubly tangent to the ring internally. Show that the horizontal projection of the section consists of two ellipses, and that the true form of the section is a combination of two circles. Show also that if $a=2b$, a plane perpendicular to H and V, and tangent to the ring internally, cuts it in a lemniscata.

ANALYTICAL GEOMETRY.

CADET-MIDSHIPMEN.

June, 1881.—*Time allowed, four hours.*

1. Deduce the equation to the straight line (1) in terms of the intercepts a and b (2) in terms of a and p. Find the length of the perpendicular from (a, b) upon the line $\dfrac{x}{a}+\dfrac{}{}=1$. Find the tangent of the angle between the two straight lines represented by the equation $Ax^2+Bxy+Cy^2=0$.

2. Deduce the formulas of transformation by which the axes are turned through an angle φ, and find what φ must be in order that the transformation may cause the term

in xy to disappear from the equation $ax^2+bxy+cy^2+dx+ey+f=0$. Find the equations to tangents to $x^2+y^2-2x+12y+5=0$ which pass through the point (5, 6).

3. Define the Ellipse and deduce its central rectangular equation. (Give the work in full.) Find the polar equation to the ellipse by moving the origin to the left-hand focus: determine two values of r. Define Asymptotes; find the asymptotes to $3x^2-5xy-12y^2+26y=0$, and to $x^2-3xy+6x+8=0$.

4. Trace the locus of each of the following equations: $x^2-8x=4y-y^2$, $(y-2x)^2=4x$, $y^2+xy-2x^2-y+7x=12$, and $2y^2-2xy+x^2+4y-8x+12=0$. Find what the last equation becomes: (1) when the origin is moved to the centre; (2) when the locus is referred to its centre and axis.

5. Given the co-ordinates of four points: A, (a, o); B, (o, b); C, $(-b, o)$; D, (o, a). (1) Find the equations to AB and CD; (2) find the co-ordinates of the point of intersection, P, of the two lines; (3) find the equation to the locus of P, when $a+b=2c$, and trace the curve.

6. The parabola $(y-mx)^2=Px+Qy$ passes through the points $(2a, o)$ and $(o, 2b)$: find the values of P and Q and the equations to tangents parallel to the axis. Find the locus of the intersection of these tangents when m varies, and trace the curve.

DESCRIPTIVE GEOMETRY.

CADET-ENGINEERS.

JUNE, 1881.—*Time allowed, four hours.*

1. A right circular cylinder lies on H; radius of base, $1''.25$; axis inclined 30° to V; length $4''$. Required to draw the perspective of the bases of the cylinder, with the shadow on H; point of sight, (5.25, —5, 4).

2. A right circular cone stands on an inclined plane, its base touching H and V. The plane is perpendicular to V and inclined 45° to H, the radius of the base is $2''$ and the altitude $4''$. Draw the figure in perspective, point of sight (6.5, —6, 5).

3. A cone and a plane are given as in the preceding question, except that the base of the cone is an ellipse which is horizontally projected into a circle of $2''$ radius. Draw the perspective of the portion of the cone included between its base and a second plane perpendicular to V, inclined 30° to H and passing through (8.5, 0, 0). Write a brief statement of the method used in finding the section.

4. An ellipsoid, semi-axes, $1''.25$, $2''$, and $3''$ lies on H, and touches V; major axis horizontal, minor axis vertical. Find the projections and true form of the section by a plane whose horizontal and vertical traces are inclined 60° and 30° to the ground-line the vertical trace passing through the point where the ellipsoid touches V. Explain the method of finding the projections of the section.

DESCRIPTIVE GEOMETRY.

CADET-MIDSHIPMEN.

JUNE, 1881.—*Time allowed, four hours.*

1. Find where a given line pierces an oblique plane given by its traces. Draw two parallel lines and find where a third line pierces the plane of these lines without finding the traces.

2. Draw two lines which intersect, and find the angle between them. Find the length of a perpendicular let fall from a given point upon a given oblique plane. Show how this perpendicular is found when the plane is parallel to the ground-line.

3. Find the angle between two planes: (1) the general case; (2) when the vertical traces intersect while the horizontal traces are parallel; (3) when both planes are parallel to the ground-line.

4. Define stereographic projection. What is meant by a subcontrary section? Prove that the subcontrary section of an oblique cone with a circular base is a circle. Prove that the stereographic projection of any circle of the sphere is a subcontrary section of a certain cone.

5. What are the principal properties of the stereographic projection? Find expressions, in terms of the polar distance and inclination of a circle, for the distances from the centre of the primitive to the extremities of a diameter of the projection. Draw a primitive circle of 1″.5 radius, assume a point inside and one outside, and draw the great circle joining the two points.

6. Make the following projections of the astronomical triangle:

(*a*) Given d, 45° N.; h, 45°; L, 25° N. *Plane of meridian.*
(*b*) Given p, 75°; h, 30°; t, 25°. *Plane of equator.*
(*c*) Given d, 45° N.; L, 30° N.; t, 60° E. *Plane of prime vertical.*

7. Given t, 45° W.; Z, 120° W.; project the triangle on the plane of the horizon; given (1) $\mathrm{L.}=30°$ N.; (2) $h=45°$; (3) $\mathrm{M}=60°$. Explain the methods used in the last two cases.

8. Draw a right circular cone showing both nappes, and cut it by a plane so that the section may be a hyperbola. Find the true form of the section and construct the asymptotes.

9. Find the horizontal projection of the intersection of a cylinder and sphere—the base of the cylinder is a circle, radius 1″.25, centre at (1.5, 1.5, 0); the elements are parallel to V and inclined 60° to H—the centre of the sphere is at (3.25, 2.25, 2.25, and the radius 1″.5. Make the drawing as though the cylinder were removed. Explain how a tangent to the curve may be drawn.

INTEGRAL CALCULUS.

ELECTIVE COURSE.

JUNE, 1881.—*Time allowed, four hours.*

Cadet-Midshipmen G. W. Street, S. D. Greene, W. E. Bowman, C. E. Sweeting, J. B. Jackson, and M. E. Lennon.

Cadet-Engineers W. J. Baxter, S. W. Armistead, C. P. Eaton, W. S. Aldrich, G. W. Dyson, J. M. Ellicott, G. F. Zinnell, G. W. Littlehales, and C. J. Gross.

Find the integrals of the following expressions:

1. $\cos^2\theta d\theta,\ \sin^2\theta d\theta,\ \frac{d\theta}{\sin\theta},\ \frac{d\theta}{\cos\theta}$, and $\frac{dx}{\sqrt{x^2\pm a^2}}$.

2. $\frac{dx}{\sqrt{2ax-x^2}},\ \sqrt{a^2-x^2}.dx,\ \sqrt{x^2+a^2}.dx.$

3. $\frac{d\theta}{a+b\cos\theta},\ [(1)\ a>b\ (2)\ a<b],\ \frac{dx}{(1+x^2)\sqrt{1-x^2}},$

4. $\frac{x^2dx}{1+x^2},\ \frac{(x^2+x+1)\,dx}{(x-1)^3\,(x+2)\,(x^2+2x+3)}.$

5. $\frac{(x^2-1)\,dx}{x\sqrt{1+3x^2+x^4}},\ \frac{(ax+b)\,dx}{x^2+cx+d}.$

6. Find the whole area of the curve, $(x^2+y^2)^2=4a^2x^2+4b^2y^2$.

7. Trace the locus of the equation $x^{2m+1}-a\ (2m+1)\ x^my^m+y^{2m+1}=0$, showing that it differs in form according as m is odd or even. Prove that the area of the loop is $(2m+1)\ \frac{a^2}{2}$, and that the area included between the infinite branches and the asymptotes is equal to the area of the loop.

8. A solid is formed as follows: the base is a square $ABCD$, side a; at A, B, C, and D perpendiculars are erected to the plane of the base, $AE=b$, $BF=c$, $CG=d$, $DH=e$; planes through these perpendiculars and the sides of the square form the lateral surface of the solid, and the top is a surface generated by a right line which moves along the lines EF and HG, remaining constantly parallel to the plane $EADH$. Required the volume of the solid contained between this surface and the five planes.

DEPARTMENT OF PHYSICS AND CHEMISTRY.

ELEMENTARY PHYSICS.

CADET-MIDSHIPMEN.

MAY, 1881.—*Time allowed, four hours.*

[Ten questions required.]

1. Define force, mass, velocity, stable and unstable equilibrium, energy, momentum, density, specific gravity, mean coefficient of expansion, specific heat and latent heat.

2. Analyze geometrically the action of the wind on the sails of a ship, and explain how two vessels can sail in opposite directions with the same wind. 50 kilogrammes rest upon a support which is allowed by machinery to acquire a velocity of 2.5^m per second; what is the pressure on the support?

3. A ship passes from the sea into a river, and after discharging 44,800 pounds of her cargo is found to sink to the same mark as in the sea. Required the weight of ship and cargo. Sp. gr. of sea water, 1.026.

4. A stone is dropped from a cliff and five seconds after it is heard to strike the ground: the temperature of the air being 24° C., required the height of the cliff. What is the nature of sound waves, and upon what does the velocity of sound in air depend?

5. A force measures 5.7 in C. G. S. units; what will it measure in statical units? The total heat of steam at 110° C. is 640; what is the corresponding temperature and the total heat of steam Fahr.?

6. Explain capillary phenomena, spheroidal state, mirage, the flash and noise of atmospheric electricity, the telephone.

7. Explain dispersion of light, interference of light, the Galilean telescope, the images formed by a concave mirror and a double convex lens.

8. Show how the pressure of a gas varies with its volume. Illustrate the theory that the pressure of a gas is proportional to its density. Explain the principle of the mercurial barometer.

9. What will be the result of mixing five kilogrammes of ice at 0°, one kilogramme of water at 60°, and one-half a kilogramme of steam at 100°?

10. Show that the refracting angle of a prism should be less than twice the critical angle; and also that the refracting angle and the angle of minimum deviation being known, the index of refraction may be obtained.

11. The index of refraction of alcohol is 1.374, of flint glass 1.575. What is the deviation of a ray of light which makes an angle of incidence of 20° with the normal to the surface of a flint-glass prism immersed in alcohol, the refracting angle being 61°?

12. Explain the electrophorus. What is a solenoid? Accepting Ampère's theory in regard to magnets, how do the currents flow in each pole?

ELEMENTARY PHYSICS.

CADET-ENGINEERS.

MAY, 1881.—*Time allowed, four hours.*

1. Define mass, weight, force, work, horse-power. How long must a force of 150 kilogrammes act on a mass of 2,500 kilogrammes to impress upon it a velocity of 5 metres per second? What must be the magnitude of the force which would bring the body to rest in one second?

2. Required the time of oscillation of a pendulum whose length is 0.99384^m in a place where the intensity of gravity is 9.81? Find the intensity of gravity at a place where the length of the second's pendulum is 0.991^m.

3. Define and distinguish between density and specific gravity. A man (sp. gr. 1.12) weighs 75 kilogrammes. Required the volume of cork (sp. gr. 0.24) that will just float him.

4. In the cases of a boat partially and of a body entirely immersed, explain the positions of the centres of gravity and buoyancy for a condition of equilibrium. Explain metacentre, and also the principle upon which the use of ballast depends.

5. A ship sailing into a river sinks 2^{cm}, and after discharging 12,000 kilogrammes of her cargo rises 1^{cm}; determine the weight of the ship and cargo, the sp. gr. of sea water being 1.026.

6. What are the formulas for velocity of efflux of a liquid and for quantity discharged through an orifice? From an orifice water spouts with a velocity of 9.624 metres; what is the head? In a cylinder water stands 2 metres above the aperture, and is loaded with a piston which presses with a force of 3 kilogrammes on the square decimetre: required the velocity of efflux.

7. Define sound. How is the velocity of sound affected by the temperature? In winter the report of a gun is heard 15 seconds after the flash is seen; required the distance, the temperature of the air being 10° C.

8. Define critical angle and index of refraction and express their relation. How is the altitude of a celestial object affected by refraction? Describe fully the sextant.

9. An equiangular flint-glass prism is immersed in alcohol. What is the deviation (in the prism) of a ray of light that on striking the prism makes an angle of 30° with the normal. Index of refraction of flint glass, 1.59; index of refraction of alcohol, 1.372.

10. Explain by drawings the images formed in the opera-glass, compound microscope, terrestrial telescope, and celestial telescope. State fully the position of the cross-wires in a telescope.

11. What is the cause of chromatic aberration in optical instruments, and how may the eye-piece of a telescope be arranged to counteract to some extent the chromatic aberration of the object-glass? What is the arrangement in the best opera-glasses?

[Ten questions required.]

DEPARTMENT OF ENGLISH STUDIES, HISTORY, AND LAW.

CONSTITUTION OF THE UNITED STATES.

MONTHLY EXAMINATION.

DECEMBER, 1880.—*Time allowed, two hours.*

1. Explain the expressions *writ of habeas corpus;* give the constitutional clause in reference to its suspension, and discuss the question as to who has the authority to suspend the writ, giving precedents.

2. State the powers exercised by different branches of the government over the militia, and name the occasions, with dates, upon which the militia has been called out.

3. Give a brief administrative history of the Navy, stating the principal acts, with dates, relating thereto.

4. What is a bill? an act? a letter of marque? piracy? a bill of credit? a caveat? a direct tax?

5. Explain the system of national banks.

6. Give the qualifications of Senators; of Representatives.

7. What session of what Congress began yesterday? How long does a Congress last? Between what dates is it in existence? Explain the difference between the beginning of a Congress and the beginning of a session. What is a quorum of eac House? What limitations are placed on the power of either House to adjourn?

CONSTITUTION OF THE UNITED STATES.

MONTHLY EXAMINATION.

JANUARY, 1881.—*Time allowed, two hours.*

1. State (in full) the mode of election of the President and Vice-President.

2. State the two ways in which amendments to the Constitution may be proposed and ratified. What can you say as to the power of the President to veto an amendment; as to the withdrawal by a State of its ratification?

3. Explain *reprieve*, *amnesty*, *executive session*, *prorogation*, and *dissolution*.

4. Describe the various courts composing the judiciary system of the United States.

5. State the classes of cases in which the Supreme Court has (1) original jurisdiction, (2) appellate jurisdiction. Explain the reason for the XI. amendment and its object.

6. (1) Explain the formation of the State of West Virginia. (2) Describe the position of Missouri during the rebellion. (3) Explain the method by which the States in rebellion were restored to their former position, and name the State which was the first restored.

CONSTITUTION OF THE UNITED STATES.

JANUARY, 1881.—*Time allowed, four hours.*

I. With whom rests the power to impeach? to try impeachments? to suspend public officers in recess? to expel members of Congress? to remove disabilities from persons formerly in rebellion? to originate revenue bills? to call for yeas and nays? to regulate the time, place, and manner of holding elections of Senators? to make treaties? to appoint Senators? to fill vacancies in recess of Legislature?

II. State the provisions of the Constitution in regard to the power of Congress to lay taxes in general; to lay direct taxes; to lay duties on exports. What is provided as to duties levied by the States? Explain fully all the kinds of taxes referred to in these clauses. What is a tariff? excise?

III. Give the constitutional clause relating to the census. How are Representatives appointed? What is the constitutional limit in reference to apportionment? What was the ratio of population first adopted? What is the present ratio? Describe the process of electing Senators.

IV. State the powers of Congress in regard to the Army and Navy; in regard to the militia; in regard to the prosecution of war. What is the tenure of office in the Army and Navy? Give the constitutional clause in regard to the guaranty and protection of State governments. What is the extent of the power of Congress over places ceded to the general government? What reservation is generally made in these cessions?

V. Show why a State legislature cannot revoke its own grants. How are municipal charters regarded in this connection? What was the Dartmouth College case, and what bearing does it have on this subject?

VI. What are legal tenders? What decisions have been made by the Supreme Court in regard to making Treasury notes legal tenders? Under what provisions of the Constitution were the issues made, and what is their true character? Explain the refunding act of July, 1870.

VII. Enumerate: (1) the absolute prohibitions on the States; (2) those subject to modification by Congress. What are inspection laws? Tonnage duties.

VIII. Define treason. What is necessary to the conviction of treason? What is the punishment of treason? What is constructive treason? What is corruption of blood, and how does it work? What is a bill of attainder? a bill of pains and penalties? What is the reason for the constitutional prohibition in regard to bills of attainder?

RHETORIC.

MONTHLY EXAMINATION.

FEBRUARY, 1881.—*Time allowed, two hours.*

I. (1) Name the three conditions that must be fulfilled in order that description may attain strength or sublimity. (2) Explain any one of these conditions, and show its application.

II. Give the four main rules to secure clearness, with an original example of each.

III. "A series of abstract terms is difficult to follow." (1) What are abstract terms? What is the opposite of an abstract term? (2) Show the correctness of the quoted statement, and give the modifications to which it is subject.

IV. (1) Name and distinguish the three principal violations of brevity, giving original examples of each. (2) Name the three sources of brevity.

V. Show when the coupling of synonymous words and phrases is admissible.

VI. (1) Explain fully *pathos*, *humor*, and *wit*. (2) What is meant by saying that the epigram is the purest representative of wit?

RHETORIC.

MONTHLY EXAMINATION.

APRIL, 1881.—*Time allowed, two hours.*

Omit any one of the seven questions you please; the answers to six only are required.

I. Explain the terms *rhetoric*, *scientific generalization*, *a philosophical history*, *subject world and object world*, *unity*, *figure of speech.*

II. "All our intellectual powers are reducible to three simple modes of working." Name and explain each of these modes.

III. What is a *pointed style* of composition? Explain *loose sentence*, *period*, *balanced sentence*, and state the advantages of each form of expression. Explain *antithesis*, *obverse iteration*, and *epigram*, and show how they may be combined with a balanced structure of sentences.

IV. Give the main rules governing the structure of the paragraph.

V. "A description is more easily and fully realized when made individual." Explain the statement, and give reasons for it.

VI. Explain the importance of (1) geography, (2) chronology, in the study of history.

VII. Discuss the principles: (1) "Qualifying words should precede the object that they qualify"; (2) "Expressions most nearly related in thought should be placed closest together." What general principles govern the position of the subject and the predicate?

NAVAL HISTORY.

MONTHLY EXAMINATION.

MAY, 1881.—*Time allowed, two hours.*

I. Give a tactical description of the battle near Point Drepanum, with diagram; state the date, parties, and results.

II. Explain the terms *di-ekplous*, *corvus*, *carronade*, *Greek fire*, *the dolphin.*

III. Explain when the following were first used: (1) sheathing; (2) cannon in fleet action; (3) topsails; (4) chain shot; (5) mariner's compass. Give a brief history of last named.

IV. Give an account of Blake's attack on Santa Cruz. Name the two similar attacks made by Blake at earlier periods of his career, and show how these attacks mark a stage of development in naval warfare.

V. Give a brief description of the causes of the first Dutch war. Give a full description of the battle that preceded the declaration of war.

V*. Give a tactical description of the second battle of the Texel, with diagram, commanders, and results. Why does this battle mark a new era in the history of the sail period?

IV. Give a brief account of the following: (1) De Ruyter; (2) Duilius; (3) Themistocles; (4) Penn; (5) Prince Rupert; (6) Monk. *Take four.*

NAVAL HISTORY.

JUNE, 1881.—*Time allowed, three hours.*

Starred questions are alternatives.

I. (1) Give some account of the discoveries of the early Phœnician and Egyptian voyagers. (2) Give a brief description of the construction of Egyptian galleys. (3) Explain the Greek trireme and its use.

II. Describe the battle of Salamis, giving date, opposing forces, commanders, tactics of battle, and results.

III. (*a*) Give an account of the improvements in ship-building made by the English; (1) during the Dutch wars, and (2) during the eighteenth century. (*b*) Explain the terms (1) *frigate*, (2) *close-hauled line ahead*, (3) *flush deck*, (4) *half deck*, (5) *quarter deck*.

III*. (*a*) Show how the introduction of (1) *guns*; (2) *sails*; (3) *steam-engines*; (4) *armor*, in ships of war, changed the methods of naval warfare. (*b*) When and where was the torpedo first used effectively?

IV. Give a description of the first battle of the Texel, with date, opposing forces, commanders, and results.

V. (1) Explain *breaking the line*, and point out its advantages. (2) Tell in what action, and by whom, this maneuver was first used successfully in modern warfare, illustrating the action by a diagram. (3) Explain the object of this maneuver as practiced in Greek tactics.

VI. Give a short and distinct account of the battle of Aboukir Bay, with diagram, and with details as to single ships. Give also date, opposing forces, and commanders, other officers prominently engaged, position of battle-ground.

VII. Give some account of the following officers, describing especially those qualities of mind and character in each one which bore upon his professional career, and naming the important events in the life of each: (1) Nelson, (2) Collingwood, (3) Blake.

VII*. Explain the improvements or new applications of the *steam-engine* made by the following: (1) Papin, (2) the Marquis of Worcester, (3) Watt, (4) Fulton, (5) Ericsson.

VIII. (1) Give a brief account of the only sea fight during the Franco-German war of 1870–'71, giving a description of the vessels, and the results. (2) Give a detailed account of the action off Iquique between two Peruvian iron-clads and two Chilian wooden vessels.

VIII*. State the relative strength and distribution of the opposing naval forces at the beginning of the Russo-Turkish war of 1877–'78, and give a full account of one of the five torpedo engagements of the war.

IX. Battle of Trafalgar: date, locality, opposing forces and commanders, tactical details on battle, effect on the course of the war. Draw and describe diagram of battle.

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*The starred question is an alternate.

IX*. Battle of St. Vincent: date, locality, opposing forces and commanders. Draw and describe diagram. What can you say of the crews of the Spanish ships? Allude briefly to the part taken in the engagement by Troubridge in the Culloden, Nelson in the Captain, and Collingwood in the Excellent.

DEPARTMENT OF MODERN LANGUAGES.

FRENCH.

JUNE, 1881.—*Time allowed, five hours.*

Translate into French.

HUMANITY.

A soldier of the American army was condemned to be shot. This unfortunate man, by close economy, had been able, for several years, to support his aged father and mother.

General Washington, informed of the filial piety of the offender, commuted the sentence, and only had him discharged from the regiment: "If we should cause his death," said he, "we should run the risk of killing three persons instead of one."

GREAT BRITAIN.

The British Empire comprises England, Ireland, and Scotland, with islands adjacent. England is divided into fifty shires or counties. This country produces corn, and its horses are celebrated. England has many colonial possessions. The most important is Hindustan, which is divided into three presidencies: Bengal, Madras, and Bombay. Calcutta, the capital, is situated on the Ganges. These presidencies comprise the most fruitful of the plains of India. Madras is situated on the Coromandel coast, and Bombay on the Malabar coast. The Sikhs, who possessed Lahore, the capital of a powerful empire, were defeated in four severe battles by the British army, in the year 1846.

London, on the Thames, the capital of England, is the most populous, and the most important commercial city in the world. Its port often contains more than a thousand vessels. From the middle of London bridge the Thames offers the most splendid sight. The most remarkable buildings are St. Paul's Cathedral, the Tower of London, and Westminster Abbey, which contains tombs of members of the Royal Family and monuments of celebrated men. A great number of squares, planted with trees, embellish this capital, the streets of which are generally broad and clean. Edinburgh is the capital of Scotland; but Glasgow, situated on the Clyde, is its chief commercial town. Dublin is the capital of Ireland. Near Inverness, a sea-port in Scotland, was fought the tremendous battle of Culloden, which entirely destroyed the party of the Stuarts.

Dictation.

(Taken from the "Conscrit de 1813.")

. . . "Ah! le brigand. Dieu veuille qu'il entre encore une fois chez nous! je lui fends la tête avec ma hachette."

Mr. Goulden était consterné.

"Comment! tu n'as pas crié que c'était faux!" dit-il; "c'est donc vrai cette histoire?"

Et comme je baissais la tête sans répondre, joignant les mains, il ajouta:

"Ah! la jeunesse, la jeunesse; cela ne pense à rien . . . Quelle imprudence . . . quelle imprudence!"

Il se promenait autour de la chambre; puis il s'assit pour essuyer ses lunettes, et la tante Grédel dit:

"Oui! mais ils ne l'auront pas tout de même; leurs méchancetés ne serviront à rien: ce soir, Joseph sera déjà dans la montagne, en route pour la Suisse."

—Vous avez tort, mère Grédel, de parler comme vous faites et de lui donner un mauvais conseil.

—Un mauvais conseil! dit-elle; vous êtes donc aussi pour faire massacrer les gens, vous?

—Non, répondit-il, je n'aime pas les guerres, surtout celles où des cent mille hommes perdent la vie pour la gloire d'un seul. Mais ces guerres-là sont finies; ce n'est plus pour gagner de la gloire et des royaumes qu'on lève des soldats; c'est pour défendre le pays qu'on a compromis à force de tyrannie et d'ambition. On voudrait bien la paix maintenant! Malheureusement, les Russes s'avancent, les Prussiens se mettent avec eux, et nos amis les Autrichiens n'attendent qu'une bonne occasion de nous tomber sur le dos; si l'on ne va pas à leur rencontre, ils viendront chez nous, car nous allons avoir l'Europe sur les bras comme en '93. C'est donc tout autre chose que nos guerres d'Espagne, de Russie et d'Allemagne. Et moi, tout vieux que je suis, mère Grédel, si le danger continue à grandir et si l'on a besoin des anciens de la République, j'aurais honte d'aller faire des horloges en Suisse, pendant que d'autres verseraient leur sang pour défendre mon pays. D'ailleurs, écoutez bien ceci: les déserteurs sont méprisés partout. Après avoir fait un coup pareil, on n'a plus de racines nulle part; on n'a plus ni père, ni mère, ni clocher, ni patrie . . . On s'est jugé soi-même incapable de remplir le premier de ses devoirs, qui est d'aimer et de soutenir son pays, même lors qu'il a tort."

GRAMMAR.

1. Parse the following words: Mon, le sien, quel, lesquelles.
2. What different forms does the demonstrative adjective *ce* take before nouns?
3. How do you express in French the difference between *this* and *that*?
4. Give the plural formation of nouns and the principal exceptions.
5. How is the feminine of adjectives formed? Give exceptions.
6. Give the position of objective personal pronouns in simple and in compound tenses—and also with the imperative mood.
7. What is the place of the adverb?
8. Give the names of primitive tenses of French verbs, and tell how the four conjugations are distinguished.
9. In what mood do prepositions govern the verb? Give exceptions.
10. What tense is used to express continued, repeated, and also customary action?
11. What verbs require the dependent verb in the subjunctive? Give also five of the conjunctions requiring the subjunctive.
12. When do the impersonal verbs, *il semble—il paraît* require the following verb to be in the subjunctive—and when is the verb put in the indicative?
13. What preposition must precede the infinitive limiting the meaning of an abstract noun?
14. Give the rules for the agreement of the past participle,—first with *avoir*,—also with *être*. Give an example of each one.
15. Which auxiliary is used with active verbs—which with the passive—which with the reflective?
16. Two verbs being joined in construction with the same subject, in what mood does the first govern the second?
17. Write in a table: (*a*) present indicative, first person singular and plural; (*b*) second person singular and plural of imperfect; (*c*) second person singular and plural, future; (*d*) first person singular and plural, subjunctive of *aller*, *venir*, *vouloir*, *pouvoir*, and *sortir*.

QUESTIONS ON LA FONTAINE'S FABLES.

READING AND CONVERSATION.

SECOND CLASS.

DEPARTMENT OF SEAMANSHIP.

NAVAL TACTICS.

CADET-MIDSHIPMEN ONLY.

JUNE, 1881.—*Time allowed, four hours.*

1. Draw a diagram of a fleet of 24 vessels in line, natural order, showing how it is divided into divisions and squadrons, by whom commanded, and the positions of commander-in-chief, division commanders, and squadron commanders. Draw a diagram of 12 vessels in column, natural order. Show the positions of the commander-in-chief and division commanders.

2. What is a general signal, and how is it made? How are vessels exempted from obedience to a general signal? What is a special signal, and how is it made? When is a maneuvre commenced? What is a speed signal (day and night), and how is it used?

3. A fleet being in column of vessels, in natural order, heading north, form it into columns of vessels abreast by divisions at right angles to the original direction.

4. The fleet being in line heading north, form it into double echelons from the center of divisions, preserving the original direction.

5. The fleet being in line, heading north, form it into double echelons from the flanks of divisions on their left-centre vessels, preserving the original direction.

6. The fleet under sail, change from a single column of vessels to columns of vessels abreast by divisions, with the rear division to windward.

7. Change from line to double echelon inverted, from the right and left of fleet, on right centre vessel, fleet heading north.

8. The fleet in double echelon, what is the natural order, reverse order, inverted order, and reverse inverted order?

DEPARTMENT OF ORDNANCE AND GUNNERY.

INFANTRY TACTICS.

CADET-MISHIPMEN ONLY.

JANUARY, 1881.—*Time allowed, four hours.*

1. Describe the formation of a company of infantry, giving the posts of the officers, sergeants, and music. How formed in two ranks and in fours.

2. To form line from column of fours; to the right or left.

3. Describe the formation of a battalion of infantry, posts of officers, and regimental staff, general guides and markers, field music and band. Form the battalion.

4. The battalion being at a halt, "to break from column of divisions at full distance to column of companies."

5. Deploy a battalion forward as skirmishers. How are intervals closed and extended? The battalion being deployed as skirmishers, assemble the battalion.

6. Describe the dress parade of a battalion of infantry.

GUNNERY.

CADET-MIDSHIPMEN ONLY.

JUNE, 1881.—*Time allowed, four hours.*

1. How is the battery of a ship of war supplied with powder? How are the passing scuttles arranged, and how many men are required for each chain of scuttles, and what are their duties?

2. Give the stations of a crew at a broadside gun, 16 men and a powder-man, giving he titles on the right and left sides of the gun, and the arms belonging to each man.

3. Give the words of command in their proper order in the exercise of broadside M. L. guns, and explain in detail the duties of each member of the gun's crew at the order "load."

4. Draw and give the nomenclature of the 3-inch B. L. R.

5. Describe the organization on board ship of the companies of infantry, the crews for howitzers and machine guns for service on shore, as given in the ordnance instructions.

6. Discuss the corrections for speed and wind in connection with pointing, and explain why the correction for speed is of important consideration in the service of modern ordnance.

DEPARTMENT OF STEAM ENGINEERING.

DESIGNING MACHINERY.

CADET-ENGINEERS ONLY.

JUNE, 1881.—*Time allowed, five hours.*

[Questions having the same number are alternates.]

1. (See Fig. 1.) Stroke of engine, 4, revolutions per minute, 100; the shaft revolves with uniform velocity: find the velocity of the piston when the crank is in the position shown.

2. Construct, by means of the odontograph, two teeth of a spur wheel of $\frac{1}{2}''$ diametral pitch having 32 teeth.

3. The mandrel of a lathe is to be driven at a series of 8 speeds increasing in geometric proportion with a common ratio of 2; the speed changes are effected by means of a pair of equal and opposite cone pulleys on mandrel and counter-shaft, and by back gear. Find a train for and make a sketch of the back gear, the pinions having 32 teeth.

4*a*. The length of the driving-arm of a Whitworth quick return motion is 3″, and the ratio $\frac{\text{period of advance}}{\text{period of return}} = \frac{7}{5}$; find, graphically, the distance between the centres of the driver and follower, and the length of the slot.

4*b*. (See Fig. 2.) Construct a cam which, by oscillating through an angle of 45° with uniform angular velocity, shall give a uniform ascending and descending motion to a rod which moves in the path BB'. The cam is to move on an axis of which A is the trace, and is to give the ascending motion when moving in a left-handed direction.

5*a*. Two axes A and B meeting at an angle of 90° are so connected by level wheels that they revolve with an angular velocity, ratio $\frac{A}{B} = \frac{3}{5}$, the wheel B having 24 teeth. Find the number of teeth of the spur wheel whose teeth are developments of those of A.

5*b*. (See Fig. 3.) Axes MN and PQ revolve with equal angular velocities in a left-handed direction as viewed from the ends M and P respectively; connect them by flat bands and pulleys, the latter being 20″ diameter. (Make the sketch to the given scale.)

6*a*. (See Fig. 4.) Determine the number and direction of the revolutions made by the wheel D while the arm E makes one revolution about the axis X, the wheel A being fixed.

6*b*. (See Fig. 5.) Determine the extent of the motion of the cutters for each revolution of the boring-bar.

7*a*. (See Fig. 6.) Find to the nearest $\frac{1}{8}''$ the travel of a slide-valve driven by the given link motion; the link block being at S. Also indicate the virtual angular advance.

7b. The crank of a steam engine is 10$''$ from a dead centre when the slide-valve opens to admit steam, and the piston is at $\frac{1}{3}$ stroke from beginning when the steam is cut off; width of steam port opening being 1$''$: find the angular advance of the eccentric, the lap of the valve, the eccentric arm, and the amount of lead. Give answers to the nearest $\frac{1}{8}''$. (Angularity of connecting-rod not considered.)

8*a.* The diameter of the circle passing through the centres of the paddles of a feathering-wheel is 20$'$; immersion of centres of paddles, 2$'$ 6$''$; depth of paddles, 3$'$; length of stem levers, 2$'$; slip, 25 per cent.; the paddles leave water which is moving aft with $\frac{1}{8}$ the velocity of the centre of the vertical paddle. Find the centre of the eccentric, making the construction to a scale of $\frac{3}{8}'' = 1'$.

8*b.* (See Fig. 7.) *AB* is the lower lever of the parallel motion of a steam indicator, the tracing-point being at the middle of the connecting link, and having a straight (approximate) stroke of 2$''$; the fixed centre of the upper lever is in the line *CD*. Find the path of the tracing-point and the upper fixed centre.

9*a.* The temperature of a furnace is 3100° F., and that of the chimney-gases 550°; the combustion of 1 pound of coal gives 13800 thermal units; the mean rates of transmission of heat is 5000 units per hour, per square foot of heating-surface. Find how many pounds of coal per hour, and how many square feet of heating-surface are required to evaporate 2400 pounds of water per hour from 120° F. to steam of 81 pounds pressure per gauge.

9*b.* A certain engine requires 1,200 pounds of steam per hour at a temperature of 300° F.; temperature of feed water, 120° F.; density of feed water $= \frac{5}{8}$ per hydrometer; density of water in boiler $= 1\frac{3}{4}$ per hydrometer. Find the weight of feed water per hour, and the percentage of heat lost in the water blown off, to keep the water at the required density.

10*a.* Find the volume of a jacketed cylinder for a condensing-engine to develop 800 HP under the following conditions: Saturated steam of 75 pounds per gauge initial pressure; cut off at $\frac{1}{4}$ stroke from beginning; clearance $= \frac{1}{8}$ piston displacement; back pressure before closing exhaust valve $= 4$ pounds; final pressure of recompression $= 16$ pounds; revolutions per minute $= 80$.

10*b.* From indicator-diagram and data on sheet K, find the efficiency of the boilers.

11. Construct an indicator-diagram for a non-condensing engine of 33$''$ stroke with 3$''$ clearance; initial steam-pressure 57 pounds per gauge; the variations of pressures and volumes following Mariotte's law; the steam-valve opens at beginning of stroke and closes at 3$''$ from beginning of stroke; exhaust-valve opens 1$''$ from end of stroke and closes 9$''$ from end of stroke. (Scale of pressures, $\frac{1}{16}'' = 1$ pound; scale of stroke, $1\frac{1}{2}'' = 1'$.)

12. The indicator-diagram on sheet K was taken from the engines of a ship steaming 10 knots per hour. New engines are to be built to drive her 12 knots per hour with a mean piston pressure of 30 pounds per square inch, and a piston speed of 800 feet per minute: find the required piston area in square feet, the percentage of loss from slip, friction, etc., remaining the same.

DEPARTMENT OF ASTRONOMY, NAVIGATION, AND SURVEYING.

ASTRONOMY.

CADET-MIDSHIPMEN.

JANUARY, 1881.—*Time allowed, four hours.*

1. When is a transit instrument accurately adjusted in the plane of the meridian? What is the chief use of the altitude and azimuth instrument? State, without explaining, five reasons which tend to prove the rotation of the earth on its axis. State the lengths of the polar and equatorial diameters of the earth.

2. How would you construct a vernier to read to 7½ seconds of arc, the limb being divided to 7½ minutes? What is the cause of the index-error of a sextant, and how is it applied to an observed altitude? Give the signs of application to an observed altitude of refraction, parallax, and dip, and the reason for each.

3. Explain the methods of the text for finding the latitude at sea. How is the longitude found at sea, using a chronometer? Define solstitial colure.

4. Define equation of time in terms of hour-angle, and of longitude and right ascension. To what two causes is it due? State the law of universal gravitation, and verify it in the case of the moon.

5. State Kepler's laws. What is the cause of precession? Define sidereal, tropical, and anomalistic years, and state the causes of the differences of their lengths. Which one is used in the calendar, and why?

6. Deduce formulas for finding the distance of the moon from the earth. Find the sidereal period of the moon. What causes the moon's libration in longitude?

7. State the seven elements of a planet's orbit. An occultation occurring at new moon, will the star disappear behind the bright or dark limb of the moon?

8. State the causes of the daily inequality of the tides. How can you determine the corrected establishment of a port? What causes spring-tides, and when do they occur? Which of the tides of a certain day will be the higher, and why?

9. What is the difference between a parallel of latitude and a circle of latitude? When occurs the apparent retrograde motion of an inferior planet? Explain the phenomena presented by Jupiter's satellites.

10. What are comets, shooting-stars, and ærolites? When do the most prominent star-showers occur? State the elements of the parabolic orbit of a comet. How are stars catalogued? What is a binary star? What is the difference between astronomical and civil time?

ASTRONOMY.

CADET-MIDSHIPMEN.

JUNE, 1881.—*Time allowed, four hours.*

1. It is intended to place a light which shall be visible at a distance of thirty sea miles to an observer twenty feet above the water. Required, the necessary height of the light.

2. June 20, 1881, in Long. 6^h E. Required, the time of p. m. high-water, the establishment being $6^h\ 20^m$; required, also, the moon's declination at the instant of high-water.

3. June 5, 1881, at Annapolis. Lat. 38° 58′ 53″ N. Long. $5^h\ 5^m\ 56^s.5$ W. Required, the local mean time of the transit of Jupiter, and its meridian altitude.

4. June 5, 1881, at $8^h\ 30^m$ a. m. local mean time, the true distance of the moon from the sun is 94° 30′. Required, the longitude. [Work to second differences.]

5. June 5, 1881, at Annapolis. A bright star is seen crossing the meridian at $9^h\ 11^m\ 45^s$ p. m. at an altitude of about 71°, and bearing south. Required, the name of the star. [Show work.]

6. June 5, 1881, in Long. 6^h E. W. T. obs. $10^h\ 10^m\ 30^s$ a. m. C—W $8^h\ 20^m\ 0^s$ C. C. — $0^h\ 25^m\ 20^s$. Required, the local sidereal time; also the hour angle of the star Sirius.

7. June 5, 1881, at 5 p. m. Greenwich mean time. Observed altitude of moon's lower limb 35° 20′ 0″. Height of eye, 25 feet. In. cor., +2′ 0″. Required, the true altitude of the moon's centre. At same time, the observed double altitude of sun's lower limb by artificial horizon is 80° 0′ 0″. In. cor., +2′ 0″. Required, the true altitude of the sun's centre. At same time, the observed altitude of a star is 35° 0′ 0″. In. cor., +2 0″. Height of eye, 25 feet. Required, the true altitude of the star.

ASTRONOMY.

CADET-ENGINEERS.

JUNE, 1881.—*Time allowed, four hours.*

1. Illustrate by a figure and define vertical circle, prime vertical, altitude, azimuth, hour angle, right ascension, declination, and the parts of the astronomical triangle. Define solar and sidereal time.

2. What is the astronomical clock, and how is its error found? When is a transit instrument accurately adjusted? What are the uses of the meridian circle and altitude and azimuth instrument?

3. Show how the form of the earth and the length of its radius are determined. Explain briefly the different proofs of the earth's rotation on an axis. What is the cause of the moon's libration in longitude?

4. Define eliptic, vernal equinox, solstitial colure, sidereal, tropical, and anomalistic years. Explain, and illustrate by a figure, the determination of the elliptical form of the earth's orbit.

5. State the cause of the change of seasons and of what this cause is the result. Explain the origin of the calendar now in use. What is nutation?

6. Deduce the formulas for determining the distance of the moon from the earth. State the distance.

7. At what phase of the moon does a lunar eclipse occur? State the different kinds of lunar eclipses and of solar eclipses. Which occur more frequently, and why? Which are seen more frequently at any place, and why?

8. State the causes of the tides and the causes of the daily inequality of the tides. Which tide of the day will be the higher? What is priming, and when does it occur? Name the planets in the order of distances from the sun, and in the order of magnitudes, and state the number of satellites by which each is attended.

9. What recently discovered fact tends to disprove the nebular hypothesis? What is the late theory regarding the composition of comets? Upon what depends the angular length of a comet's tail? State the five elements of a comet's orbit (parabolic).

10. Into what classes are meteors divided? In what months do the most prominent star-showers occur? How are fixed stars classified, and how catalogued? What is the distinction between double and binary stars?

DEPARTMENT OF PHYSICS AND CHEMISTRY.

HEAT.

JUNE, 1881.—*Time allowed, four hours.*

[Ten questions required; viz., the seven starred and any other three.]

1*. What precautions must be observed in determining the boiling point of water? What are the English and French standards of length and mass? Define specific heat; latent heat. Why does a pond 4 feet deep freeze over more quickly than one 40 feet deep?

2*. You have taken ashore at Toulon an English-made barometer to compare with a French standard barometer (both scales brass). The English reads $28''.34$, the French, 722^{mm}; temperature 10° C. What is the error of your barometer? Coefficient of expansion of brass is .000019.

3*. Explain fully Regnault's method of determining the absolute dilatation of mercury, and derive the formula.

4. Define dew-point, relative humidity, hygrometric quality. Explain the wet and dry bulb hygrometer.

5*. Find the weight of a litre of air, temperature of dry bulb 20° C., wet bulb 15° C., barometer 755^{mm}, maximum tension corresponding to $15° = 12.7^{mm}$, specific gravity of aqueous vapor 0.6235, specific heat of air 0.2375.

6. What will be the true weight of a body (specific gravity of substance being 2.5) which weighs 100 grammes in the air of which the weight was determined in previous question? Specific gravity of weight, 9.

7. What relation exists between the radiating and absorbing powers of vapors, and how does this explain the presence of dark lines in the solar spectrum? What is meant by quality of heat rays?

8. Explain the flow of heat across a wall, and also the difference between transmission of heat and transmission of temperature.

9*. How many litres of steam at 100° C. will be necessary to melt 10 kilogrammes of ice at 0° C. and raise the temperature to 23° C.?

10. Make a careful drawing of Regnault's apparatus for determining the specific heat of gases, and explain how the weight of gas which passes through the calorimeter is determined.

11. Given the specific heat of air under constant pressure (0.2375), find the specific heat of air, the volume remaining constant. Specific gravity of Hg. 13.596.

12*. A rain-drop falls from the height of $1\frac{1}{2}$ miles. How much would its temperature be raised, assuming that it imparts no heat to the air or the ground? The heat required to raise a pound of water from 0° C. to 200° C. and vaporize it, represents mechanical work which would be sufficient to raise a ton weight through what height?

13*. State what transformations the heat generated in a furnace of a steamship crossing the ocean undergoes, and what finally becomes of it.

Prove that there can be no lower temperature than the zero of the absolute scale.

CHEMISTRY.

JANUARY, 1881.—*Time allowed, four hours.*

[When two questions are numbered alike, each cadet will elect which he will answer. No mark will be given on more than one of these questions.]

1. State the laws of definite and multiple proportions, and illustrate them by the oxides of nitrogen.

1*. State the three laws which govern the gaseous condition of matter.

2. Define atom; molecule; analysis; synthesis; specific gravity.

2*. Under what four heads may all chemical reactions be grouped? Define each.

3. Show by graphic symbols what is the condensation ratio of H_2O, HgO, H_3N, H_3P, HCl, $CdCl_2$.

3*. Prove that the specific gravity, referred to H, of a substance in the state of a gas, gives us one-half its molecular weight.

4. Analayze the following reaction: $2\,KNO_3 + S + 3\,C = 3\,CO_2 + 2\,N + K_2S$.

4*. By the action of sulphuric acid on potassium chloride, perchloric oxide, potassium perchlorate, hydrogen potassium sulphate, and water are found. Write the reaction.

5. Write the chemical names for Ag_2S, $Pb\,(NO_3)_2$, H_2SO_4, H_2SO_3, Na_2SO_3, $Ba_2\,(C_2H_3O_2)_2$.

5*. Write the formulas for sodium oxide, sodium hydrate, sodium nitrate, calcium sulphate, calcium sulphite, calcium sulphide, ferrous chloride, ferric chloride.

6. What volume of pure glycerine (Sp. Gr. 128) will be required to furnish 1 kilo. of tri-nitro-glycerine? How is nitro-glycerine made?

6*. The percentage composition of a gun cotton being C24.24, H2.36, N14.14, and O59.26, find its simplest empirical formula.

7. Five grammes of a gunpowder gave on analysis 3.75 grms. of KNO_3, 1.13 grms. of C, and 5.39 grms. of $BaSO_4$. Calculate the percentage composition.

8. Describe the process for making cast iron; wrought iron; steel by the cementation process; steel by Bessemer process.

9. Iron rust destroys sails. Charcoal destroys sewer gases. Explain the action of these substances, and give other examples of this action.

10. In two similar jars, filled with O, equal weights of C are burned. In experiment 1 the charcoal is in one mass. In experiment 2 it is powdered. Compare the quantity and intensity of the energy developed in each case.

10*. What constitutes an explosion? To what do explosives owe their energy?

11. What are the relative advantages of Chili and India saltpetre for use in gunpowder? How may they be distinguished from each other? What are the sources of each?

11*. Why is H_2SO_4 used in making nitro-glycerine? Give other examples of its use which depend on the same characteristic.

12. What is dynamite? Gum dynamite or explosive gelatine?

12*. Write the graphic formula for glycerine, and show how its various nitro-substitution products may be found. What is a nitro-substitution product?

DEPARTMENT OF MECHANICS AND APPLIED MATHEMATICS.

CALCULUS.

JANUARY, 1881.—*Time allowed, four hours.*

1. Given $y = \frac{b}{3a^2} \log \frac{a + bx^3}{x^3} - \frac{1}{3ax^3}$, to find $\frac{dy}{dx}$;

$$\text{and } y = \left(\frac{a+b}{ab^2}\right)^{\frac{1}{2}} \tan^{-1} \left[\frac{\sqrt{a} \tan x}{\sqrt{(a+b)}}\right] - \frac{x}{b}, \text{ to find } \frac{dy}{dx}.$$

2. Evaluate $\left.\frac{x(\varepsilon^{2x} + \varepsilon^x)}{(\varepsilon^x - 1)^3} - \frac{2\varepsilon^x}{(\varepsilon^x - 1)^2}\right]_0$, and $\left.\left(\frac{\log x}{x}\right)^{\overline{x}}\right]_\infty$.

3. (*a*) If a square piece of sheet-lead whose side is a have a square cut out at each corner, find the side of the latter square in order that the remainder may form a vessel of maximum capacity.

(*b*). A cylindrical trough is constructed by bending a given rectangular sheet of tin, its breadth being denoted by $2a$; find the radius of the cylinder when the capacity of the trough is a maximum.

4. (*a*) Expand $\frac{\varepsilon^x}{1+x}$ in powers of x; find five terms.

(*b*) Given $\log\left(\frac{n+h}{n}\right) = 2\left[\frac{h}{2n+h} + \frac{1}{3}\frac{h^3}{(2n+h)^3} + \frac{1}{5}\frac{h^5}{(2n+h)^5} + \cdots\right]$,

and $\log_\epsilon 2 = 0.6931472$, compute $\log_\epsilon 17$.

5. (*a*) Trace the curve $y^2(x - a) = x^3 + ax^2$. (*b*) Derive the equation—

$$\frac{ds}{d\theta} = \left[r^2 + \left(\frac{dr}{d\theta}\right)^2\right]^{\frac{1}{2}}.$$

6. Derive the expression for the radius of curvature in rectangular co-ordinates, and find the radius of curvature of the ellipse.

7. Find the value of $\int_2^3 \frac{x^2\,dx}{(x-1)^2(x^2+1)}$, and of $\int_1^2 \frac{(x+1)\,dx}{x(1+x^2)}$.

8. Integrate $\frac{d\theta}{\sin^{\frac{3}{2}}\theta \cos^{\frac{5}{2}}\theta}$, and find the whole area between the axis of x and the curve $y(a^2 + x^2) = a^3$.

9. (*a*) Find the area of the trochoid $x = a\psi - b \sin\psi$, $y = a - b\cos\psi$.

(*b*) Find the length of the cardioid, $r = a(1 + \cos\theta)$.

10. (*a*) Find the area included between the curves,

$$y^2 - 4ax = 0, \text{ and } x^2 - 4ay = 0.$$

(*b*) The curve $xy^2 = 4a^2(2a - x)$ revolves about its asymptote; find the volume generated.

Extra question.

(*a*.) Find the volume of a barrel whose height is $2h$, and whose longitudinal section through the centre is a portion of an ellipse, the foci being at the ends of the barrel, and whose transverse diameter is $2b$.

(*b*.) Evaluate $\int_0^1 \frac{\log x \, dx}{(1-x)^{\frac{1}{2}}}$.

MECHANICS.

JUNE, 1881.—*Time allowed, four hours.*

1. A weight of 6 pounds resting on an inclined plane whose height is 3 feet and whose base is 4 feet is attached by a string to an equal weight hanging over the top of the plane; find how much must be added to the weight on the plane that there may be equilibrium, and determine the pressure on the plane.

Two small rings slide on the arc of a smooth vertical circle, a string passes through both rings and hangs below the arc, three equal weights being attached to it, one at each end and one on the portion between the rings; find the position of the rings when they are in equilibrium.

2. A heavy uniform rod is capable of moving in a vertical plane about a hinge at one extremity; a string fastened to the other extremity passes over a smooth peg vertically above the hinge, and at a distance from it equal to the length of the rod, and has a weight P attached to it; determine the position of equilibrium of the rod, and its pressure on the hinge.

Or—

2. Construct a screw such that a force of 112 pounds acting on an arm of ten times the radius of the screw may raise 5 tons.

3. Two right cones have a common base and have their vertices on the same side of the base; determine the centre of gravity of the solid included between these cones.

Find the centre of gravity of the solid formed by the revolution of the sector of a circle about one of its extreme radii.

4. Derive the equation of the catenary.

Or—

4. A man walks with uniform velocity in a straight line dragging after him a weight attached to a rope whose length is a, the initial position of the weight being in a perpendicular to and at the distance a from the straight line; determine the equation of the path described by the weight.

5. Derive the laws of falling bodies.

A body dropped from the top of a tower whose height is 60 feet, reaches the bottom of a well at the foot of the tower in 3 seconds; find the depth of the well.

6. A body describes, in successive intervals of 4 seconds each, the spaces 24 feet and 64 feet in the same straight line; determine the accelerating force and the velocity at the beginning of the first interval.

Prove that the momentum of a system is the same after impact as before, and that the relative velocity after impact is $-\varepsilon$ times the relative velocity before impact.

7. A ball moving on a smooth horizontal table impinges on two others in all respects like it which are lying in contact, at the same moment; determine the mutual elasticity of the balls if the impinging one is brought to rest.

The earth being regarded as a sphere of uniform density, derive a formula for determining gravity at any place.

8. Find the time of oscillation of a single pendulum (three terms)

Given the radius of gyration of a body about an axis through the centre of gravity parallel to the axis of suspension, and the distance between these axes; derive a formula for determining the length of the equivalent simple pendulum.

9. The directive force tending to restore a magnetic needle to its initial position when deflected, being proportional to the deflection and acting at the pole of the magnet, find the time of one oscillation.

Or—

9. Determine the radius of gyration of a chord, subtending the angle 2α at the centre of a circle whose radius is a, about an axis passing through the centre of the circle perpendicular to its plane.

FOR CADET-MIDSHIPMEN.

10. Show that the time of describing any portion PQ of the path of a projectile is proportional to the difference of the tangents of the angles which the tangent lines at P and Q make with the horizon.

Divide a rectangular aperture in the side of a vessel, kept constantly filled with fluid to the top of the aperture, by a horizontal line so that the quantities discharged per unit of time from the two apertures may be equal.

FOR CADET-ENGINEERS.

10. A rod, whose length is 20 feet and transverse section is half of one square inch, bears a dead load of 5,000 pounds; find the live load that will produce an instantaneous elongation of another tenth of an inch.

A wagon weighing 5 tons and attached to a rope worked by a stationary engine is going down an inclined plane at the rate of four miles per hour, when it is suddenly stopped; find the greatest tension on the rope, which has a sectional area of four square inches, and is 600 feet in length. $E=25,000,000$, $g=32$.

Extra question.

Find the centre of gravity of the portion of the solid $z^2=xy$ which is cut off by the five planes $x=0$, $y=0$, $z=0$, $x=a$, $y=b$.

Find the centre of pressure on one loop of the lemniscata, $r^2=a^2\cos 2\theta$, the initial line being vertical, and the node in the surface of the fluid.

DIFFERENTIAL AND INTEGRAL CALCULUS.

ELECTIVE COURSE.

JANUARY, 1881.—*Time allowed, four hours.*

Cadet-Midshipmen L. Nixon, J. T. Arnold, and S. S. Wood.

Cadet-Engineers R. W. Gatewood, E. Theiss, G. R. Ferguson, J. H. Fitts, and W. H. P. Creighton.

1. Evaluate $\left.\dfrac{(1+x)^{\frac{1}{x}}-\varepsilon}{x}\right]_0$, and find the value of $\left.\dfrac{dy}{dx}\right]_{a,\,a}$, having given

$$x^3-3axy+y^3+a^3=0.$$

2. Given $\dfrac{x}{\varepsilon^x-1}=1-\dfrac{x}{2}+B_1\dfrac{x^2}{1.2}-B_2\dfrac{x^4}{1.2.3.4}+B_3\dfrac{x^6}{1.2\ldots6}-\ldots$, derive a series for $\theta\cot\theta$.

Prove De Moivre's theorem, and thence show that $\sqrt[i]{i}=\varepsilon^{\frac{\pi}{2}}$.

3. Trace the curve $y\,(1+\varepsilon^{\frac{1}{x}})=x\,(1-\varepsilon^{\frac{1}{x}})$.

If $x=a\varepsilon^{\theta}\cos\varphi$, and $y=a\varepsilon^{\theta}\sin\varphi$, prove that

$$y^2\frac{d^2u}{dx^2}-2xy\,\frac{d^2u}{dxdy}+x^2\frac{d^2u}{dy^2}=\frac{d^2u}{d\varphi^2}+\frac{du}{d\theta}.$$

4. Prove Lagrange's theorem, and expand y^3 in powers of x, having given $y = a + xy^3$.

5. Trace the curve $y = x^2 \operatorname{cosec}^2 x$, and find the area between the curve and the axis of x from $x = 0$ to $x = \frac{\pi}{2}$.

6. Evaluate $\int_0^\infty \frac{\log x dx}{a^2 + x^2}$, and express in gamma-functions $\int_0^1 (1 - x^n)^{\frac{1}{n}} x dx$.

7. Find the area of the loop of the curve $x^5 + y^5 - 5ax^3y = 0$.

Find the length of the curve

$$y = \frac{a}{2}\left(\varepsilon^{\frac{x}{a}} + \varepsilon^{-\frac{x}{a}}\right), \quad z = \frac{}{8}\left[y\left(\varepsilon^{\frac{x}{a}} - \varepsilon^{-\frac{x}{a}}\right) - 2x\right].$$

8. The axis of a right cone coincides with the generating line of a cylinder; the diameter of both cone and cylinder is equal to the common altitude; find the volume and the surface of each of the parts into which the cone is divided by the cylinder.

MECHANICS.

ELECTIVE COURSE.

Cadet-Midshipmen L. Nixon, J. T. Arnold, and S. S. Wood.

Cadet-Engineers R. W. Gatewood, E. Theiss, W. H. P. Creighton, G. R. Ferguson, and J. H. Fitts.

1. A man is in a boat on a river at a distance a from the shore and b from a fall of water ahead; if the velocity of the stream be V, prove that he cannot escape the fall unless he can row with a velocity $\frac{a}{\sqrt{a^2 + b^2}} V$, and that, in case he can row at this pace, the direction in which he must row is at right angles to the line joining his position with the point of the bank opposite the fall. Find also the direction in which he will have the least distance to row to reach the bank, supposing his velocity greater than this minimum.

2. A particle acted upon by two centres of attraction, each attracting with an intensity varying inversely as the square of the distance, is projected from a given point between them; find the velocity of projection that the particle may just arrive at the initial point of attraction and remain at rest there.

3. A fine thread having two weights each equal to P suspended at its extremities is hung over two smooth pegs in the same horizontal line; a weight Q is then attached to the middle portion of the string between the pegs and allowed to descend under gravity; find the velocity of Q at any depth below the horizontal line.

4. Show that the velocity at any point of a central orbit is independent of the path described, and depends solely on the intensity of the attraction, the distance of the point from the centre, and the velocity and distance of projection.

5. Find the law of attraction in order that a particle may describe the lemniscata. $r^2 = a^2 \cos 2\theta$, the centre of attraction being at the pole.

6. One particle begins to fall from the higher extremity of a vertical line, and at the same instant another is projected upwards from the other extremity with a given velocity, the particles moving in a medium of which the resistance varies as the velocity; show that the time at which they will meet will be $\tau \log \frac{V\tau}{V\tau - a}$, where a is the length of the line, V is the velocity of projection, and the retardation due to the resistance is $\frac{1}{\tau}$ of the velocity.

7. A heavy particle is projected from a given point in a given direction with a given velocity, and moves in a uniform medium, whose resistance varies as the cube of the velocity; determine the motion of the particle.

DEPARTMENT OF ENGLISH STUDIES, HISTORY, AND LAW.

NAVAL HISTORY.

JANUARY, 1881.—*Time allowed, four hours.*

[Omit any four of the questions, except I, XI, XII.]

I. Give an account of any three of the following officers: (1) Barry, (2) Charles Morris, (3) Bainbridge, (4) Stockton, (5) Cushing, (6) Blakeley.

II. Give a general account of the measures attending the development of the Navy from 1794 to 1812, showing how the service was regarded by political parties and by the country at large, and how naval development was advanced or retarded.

III. Discuss the affair of the Chesapeake and Leopard, showing how it came about, and stating the circumstances attending the affair.

IV. Describe briefly Preble's six attacks on Tripoli.

V. Give a complete tactical description of the battle of Lake Erie, showing the mode of attack, opposing forces, and details of action, with diagram of engagement.

VI. Give an account of the cruise of the Ranger under Paul Jones in 1778, and give a brief outline of Jones's character.

VII. The cruise of the Essex.

VIII. State briefly the naval operations on the east coast of Mexico during the war of 1846–'48, and describe fully the share of the Navy in the reduction of Vera Cruz.

IX. Give a complete tactical account of any one of the four frigate actions of 1812–'13, stating dates, commanders, comparative force, details of action, important incidents, and results, with diagrams.

X. Give an account of the leading events in the French war of 1798.

XI. Describe the two actions of the Merrimac on the 8th and 9th of March, 1862.

XII. Give a full account of the battle of Mobile Bay.

DEPARTMENT OF MODERN LANGUAGES.

FRENCH.

JUNE, 1881.—*Time allowed, four hours.*

Translate into French.

THE CONSULAR GUARD AT MARENGO, JUNE 14, 1800.

At dawn of day, the Austrians crossed over three bridges which they had thrown across the Bormida, and furiously assaulted the village of Marengo.

After having sent to Desaix, who was a half day's march in his rear, the order to return with his corps to Saint Guliano, the First Consul hastened to the field of battle. It was ten o'clock in the morning. The enemy had carried Marengo; Victor's division, after the most spirited resistance, was routed, and the field to the left was covered with soldiers in flight. To the right, Lannes was struggling against the corps of the Austrian General Ott, who, being master of the village, already outflanked the French divisions he had before him.

The First Consul, knowing that success depends on maintaining the communication between his right wing and the rest of his army, gives the order to the foot grenadiers of the consular guard, to resist this movement of the enemy. These eight hundred brave men form a square which, like a granite redoubt sees the most terrible assault of Austrian cavalry break against its steadiness. It was then three o'clock in the afternoon, and every one thought the battle lost.

Melas, worn out with fatigue, thinking the victory sure, had recrossed the bridges of the Bormida, and returned to Alexandria, leaving to General Zach the task of pursuing the French army. Bonaparte alone did not despair, and counted on Desaix's arrival, with six thousand fresh troops. It was five o'clock when Desaix reached the battle-field. In Bonaparte's hands, this re-inforcement is to become the means of victory, and the army is inspired with the confidence of its chief. Wearied by its long and bloody retreat, it sees, with inexpressible joy, Desaix's division cover the left. "Soldiers," cries Bonaparte, "this is the moment to advance: remember that I am accustomed to sleep on the battle-field."

AN ANECDOTE OF LOUIS XVIII.

After the Restoration in 1814, among the titled followers of Napoleon who were most anxious to obtain employment at the Court of Louis XVIII, none showed more servility or assiduity to accomplish his purpose than Fouché, Duc d'Otrante. He at last had a private interview with the King, when he expressed his desire to dedicate his life to his service.

Louis replied: "You have occupied under Bonaparte a situation of great trust, which must have given you opportunities of knowing everything that passed, and of gaining an insight into the characters of men in public life, which could not easily occur to others. Were I to decide on attaching you to my person, I should previously expect that you would frankly inform me what were the measures, and who were the men that you employed in those days to obtain your information. I do not allude to my stay at Verona or Mittau—I was then surrounded by numerous adherents; but at Hartwell, for instance—were you then well acquainted with what passed under my roof?"—"Yes, sire, every day the motions of your Majesty were made known to me." —"Eh! what! surrounded as I was by trusted friends, who could have betrayed me? Who thus abused my confidence? I insist on your naming him immediately."—"Sire, you urge me to say what must wound your Majesty's heart."—"Speak, sir; kings are but too subject to be deceived."—"If you command it, sire, I must own that I was in correspondence with the Duc d'Aumont."—"What! De Pienne, who possessed my entire confidence? I must acknowledge," added the King, with a malicious smile, "he was very poor, he had many expenses, and living is very dear in England. Well, Mr. Fouché, it was I who dictated to him those letters which you received every week, and gave up to him twelve thousand out of the forty-eight thousand francs which you so regularly remitted to obtain an account of all that was passing in my family."

Translate into French.

THE DEATH OF CÆSAR.

The civil wars being ended, Cæsar, appointed dictator for life, began to display haughtiness. The Senate having come to him, he received it sitting, and glanced with indignation at one who advised him to rise. Antony having placed on his head a diadem, at a time when he was seated before the rostrum, Cæsar seemed not at all to disapprove of this action. That very day more than sixty citizens, having at their head Cassius and Brutus, conspired against him. Cæsar having taken his place with the Senate on the ides of March, the conspirators surrounded him, as if to pay their respects. Suddenly one of them approached him under pretext of asking a favor, and on his refusal, pulled the robe from off his shoulders. Cæsar cried out: "Violence is done to me!" At the same time Cassius stabbed him with a dagger under the throat. Cæsar seized Cassius' arm and pierced it with his stiletto; he attempted to run away, and received a second wound. Brutus, whom he regarded as his son, having thrown himself on him, he said to him: "And you also, my son!" At length, perceiving the daggers directed against him on all sides, he wrapped his head in his robe, and fell, pierced with twenty-three wounds.

Translate into English.

PASSAGE DU SAINT BERNARD, MAI 1800.

Tandis que l'Europe croit le premier Consul livré à Paris aux soins du gouvernement, il arrive à Genève et prend le commandement de l'armée; c' est là que, résolu à porter la guerre sur le Pô, il choisit la base de ses opérations sur les revers du Simplon et du Saint-Gothard. Rival d'Annibal et de César, il décide le passage de l'armée par la crête des montagnes, à plus de douze cents toises au-dessus du niveau de la mer. Les cartouches et les munitions renfermées dans de petites caisses, les affûts démontés, sont portés à dos de mulets. On a préparé des troncs d'arbres creusés de manière à pouvoir contenir nos pièces de canon; cent soldats s'attèlent à chacune d'elles. Lannes commande l'avant-garde.

Trente-cinq mille Français, conduits par Bonaparte, abordent le Saint-Bernard. Moncey marche vers le Saint-Gothard avec quinze mille hommes, pour descendre à Bellinzona. Au sein des rochers les plus escarpés, au travers de glaces éternelles, au milieu de neiges qui effacent toutes les traces et n'offrent plus qu'un immense désert, par des chemins où le pied de l'homme n'avait jamais été empreint, les Français montrent un indicible courage: gravissant péniblement, près de succomber sous le poids de leurs armes, ils s'excitent les uns les autres par des chants guerriers. Après des dangers et des fatigues inouïs, l'infanterie, la cavalerie, les bagages, les canons, ont atteint les sommités des Alpes, où nos différents corps reçoivent des moines du Saint-Bernard les secours de la plus généreuse hospitalité.

Sur le versant méridional, la marche offrit plus de difficultés encore; les soldats, les généraux, Bonaparte lui-même, prennent le parti de se laisser glisser sur un glacier presque perpendiculaire.

SPANISH. ELECTIVE COURSE.

JUNE, 1881.—*Time allowed, four hours.*

Cadet-Engineers J. H. Fitts, R. W. Gatewood, E. Theiss.

Translate into Spanish.

Washington se démet du commandement militaire, qui lui avait été confié.

. . . Le congrès avait fixé le 23 décembre pour cette imposante cérémonie à laquelle affluèrent une foule immense de citoyens. Washington fut accueilli par cette nombreuse assemblée comme devait l'être le fondateur et le sauveur de la République.

Considérant, à leur tour, ce grand homme comme l'instrument dont la Providence s'était servie pour fonder l'indépendance et assurer la liberté de l'Amérique, les illustres membres de ce congrès éprouvaient pour lui des sentiments d'une vive reconnaissance et d'une sincère admiration: et au souvenir de l'étroite union qui avait régné entre eux et lui, aux jours de la lutte et des périls, ils ne purent maîtriser leur émotion, et leurs yeux se remplirent de larmes.

Washington s'étant levé, se tourna vers le général Mifflin, président du congrès, et lui dit de cet air de dignité qu'il tenait de la nature: "Monsieur le président, je viens ici me démettre du poste éminent auquel j'avais été appelé par le vœu de mes compatriotes et l'élection de leurs représentants.

"Pénétré de l'idée de mon incapacité, je n'avais accepté ce haut rang qu'avec crainte et défiance. Mais soutenu, tout à la fois, par la justice de notre cause, par l'appui que m'ont toujours prêté les sages citoyens auxquels notre naissante patrie avait confié ses destinées, et plus encore par la faveur du ciel, j'ai pu voir enfin nos vœux accomplis et la victoire couronner nos efforts et nos sacrifices.

"Aussi, plus je repasse en mon esprit les péripéties de cette lutte à jamais mémorable, plus je sens accroître mon affection pour mes frères d'armes, mon amour pour notre

pays, et surtout ma gratitude envers cette divine Providence qui n'a cessé de veiller sur nos armes et nous a enfin conduits au port du salut.

"En présence de ces bienfaits du ciel, comment, à ce dernier acte de ma carrière militaire, pourrais-je ne pas lui en rendre des actions de grâce, et invoquer sa protection sur cette patrie bien-aimée qui, sous sa garde, nous avons arrachée des mains de nos puissants ennemis: sur ces illustres chefs qui m'ont si bien secondé dans nos combats: enfin sur ces élus de la nation qui, après avoir dirigé l'état au fort de la tempête, sont aujourd'hui appelés à parfaire notre œuvre, en dotant le pays de lois qui en assureront l'union, la force et la durée.

"Monsieur le président, ma tâche est achevée. Voici mon brevet de commandant que je dépose entre vos mains. Mais au moment de rentrer dans la vie privée, permettez-moi d'offrir, une fois encore, mes affectueux hommages à ce corps auguste que vous avez l'honneur de présider, d'après les ordres et les inspirations duquel, j'ai si longtemps combattu pour le maintien de nos droits et la défense de nos foyers."

Translate into French.

RAZONAMIENTO DE HERNAN CORTÉS Á SUS SOLDADOS.

"La causa de Dios y la de nuestro rey nos lleva á conquistar regiones no conocidas. No es mi ánimo facilitaros la empresa que acometemos: combates nos esperan sangrientos, facciones increibles, batallas desiguales en que habreis menester socorreros de todo vuestro valor; miserias de la necesidad, inclemencias del tiempo, y asperezas de la tierra en que os será necesario el suprimiento, que es el segundo valor de los hombres, y tan hijo del corazon como el primero; que en la guerra mas veces sirve la paciencia que las manos. Hechos estais á padecer, y hechos á pelear en estas islas que dejais conquistadas; mayor es ahora nuestra empresa, y debemos ir prevenidos de mayor osadia; que siempre son las dificultades del tamaño de los intentos. Pocos semos; pero la union multiplica los ejércitos, y en nuestra conformidad está nuestra major fortaleza. Uno, amigos, ha de ser el consejo en cuanto se resolviére; una la mano en la ejecucion, comun la utilidad, y comun la gloria de lo que se conquistáre. Del valor de cualquiera de nosotros se ha de fabricar y componer la seguridad de todos. Vuestro caudillo soy, y seré el primero en aventurar la vida por el menor de los soldados; mas tendreis que obedecer en mi ejemplo que en mis órdenes; y puedo aseguraros de mi que me basta el ánimo á conquistar un mundo entero, y aun me le promete el corazon con no sé que movimiento extraordinario, que suele ser el mejor de los presagios.

"Alto, pues; á convertir en obras las palabras; y no os parezca temeridad esta confianza mia, pues se funda en que os tengo á mi lado, y dejo de fiar en mi todo lo que espero de vosotros."—*Solis.*

FIRST CLASS.

DEPARTMENT OF SEAMANSHIP.

PRACTICAL SEAMANSHIP.

CADET-MIDSHIPMEN ONLY.

JUNE, 1881.—*Time allowed, five hours.*

1. A sailing-vessel having been in port for some time, get her ready for sea.
2. Get on board, rig, and send up a topsail-yard.
3. Lying in an open roadstead by the starboard anchor, head to wind, blowing out, get under way in the shortest manner possible.
4. Riding head to wind, with a shoal astern, close aboard, get under way and make sail by the wind on the starboard tack.

5. Give rules for managing boats in a surf, landing and embarking on the different beaches, carrying weights, &c.

6. Make all preparations for a gale. Ship being under royals, state to what sail you would reduce and all the preparations you would make.

7. Main tack and clew-garnet gone, what is to be done?

8. Describe the evolution of box-hauling a ship, and state when you would use it.

9. Describe the indications of the approach of a hurricane, supposing yourself in the southern hemisphere, wind E., E. N. E., and N. E., what semicircle are you in, and how will you maneuver your vessel?

10. State the lights carried by steamers and sailing-vessels, tows, pilot-boats, and vessels at anchor.

SHIP-BUILDING.

JANUARY, 1881.—*Time allowed, five hours.*

WOODEN SHIP-BUILDING.

1. Give the order in which the work performed in building a ship is executed, and the order in which the different timbers composing a ship are put together.

2. Make a sketch of a transverse section showing all timbers cut by the midship section.

3. Describe fully the keelsons of a wooden ship, showing the fastenings.

4. Upon what does the transverse strength of a ship depend. Give a plan of the deck-framing of a ship, showing all the timbers.

IRON SHIP-BUILDING.

5. Describe the transverse system of framing, and explain how longitudinal strength is obtained in this system.

6. Describe the bracket system as employed in the construction of iron-clad ships.

7. Describe in detail the best methods of bottom-plating. Are any of the outside plates connected with the decks? and, if so, how?

8. Describe the different kinds of beams and beam-arms and their connection with the ship's side. Give the rule for the spacing of beams.

LAYING DOWN,

9. Explain the three plans used in laying down a ship.

10. Construct the body plan, showing how the square stations are got in and ended. Lay off the joint (molding edge) of a cant in the body plan and end it, making use of horizontal ribband lines.

DEPARTMENT OF ORDNANCE AND GUNNERY.

ORDNANCE AND ARMOR.

CADET-MIDSHIPMEN ONLY.

JANUARY, 1881.—*Time allowed, five hours.*

1. Define cast iron, wrought iron, steel, and bronze, and give the different varieties of each metal; discuss the properties of these metals as applied to the fabrication of ordnance.

2. Define smelting, casting, puddling, forging, shingling, and piling. What is a flux?

3. Describe the fabrication of rolled armor plates.

4. Draw and describe the 80-pounder B. L. R.; give method of conversion and nomenclature.

5. Describe the kinds of strain to which a gun is subjected; explain the two methods of equalizing the strains.

6. Explain "uniform twist" and "increasing twist"; deduce the formula for the angle of rifling in both cases, and in the second case deduce the equation for the curve of the rifling.

7. Define what is meant by a "system of rifling," and state what three systems are in general use; give an example of each.

8. Describe the Bessemer process of making steel.

Questions 7 and 8 are not required, but additional credit will be given if satisfactorily answered.

ORDNANCE AND ARMOR.

CADET-MIDSHIPMEN ONLY.

JUNE, 1881.—*Time allowed, five hours.*

1. What is drift? Discuss the deviation of rifled projectiles. What forms are usually given to the heads of rifled projectiles, and what influence does the shape of the head exercise on range and accuracy, and on the penetration of armor plates?

2. Of what material are armor plates made, and what are the principal systems or forms of armor in regard to thickness of plate and material. What is compound armor and how is it fabricated? What is "backing," and what are its advantages? What advantages are claimed for deflection and air-spaces?

3. Draw and describe the S. P. directing-bar carriage.

4. Define the term "incorporation" as applied to the manufacture of gunpowder; explain the method of incorporation and give a description of an incorporating mill.

5. What are fuzes? Give those used in the service. How are fuzes classified according to mode of operation; what is fuze composition, and upon what does its rate of burning depend?

6. Define concisely and briefly the following terms used in the practice of gunnery: Line of sight; natural line of sight; line of metal; line of fire; angle of fire; angle of sight; dispart; plane of fire; plane of sight; point-blank range; range at level; extreme range; clearance angle.

7. Problem. To determine the graduation of the rear sight.

8. What is meant by concentrated fire; how calculate the angle of concentration—on the beam; on the bow or quarter?

Answers to the following questions are optional, but credit will be given for each one satisfactorily answered:

9. Describe the Schultz chronoscope?

10. Determine the distance of an object at sea by observing its angular distance from (within) the offing (Buckner's method).

DEPARTMENT OF STEAM ENGINEERING.

MARINE ENGINES.

CADET-MIDSHIPMEN.

JUNE, 1881.—*Time allowed, five hours.*

1. Saturated steam having a sensible temperature of $293^\circ.8$ is used in a steam-engine making 55 revolutions per minute; diameter of cylinder, 50 inches; stroke of piston, $3\frac{1}{2}$ feet; clearance, nozzles, etc., 3 per cent. of piston displacement per stroke;

steam is cut off at $\frac{3}{7}$ of stroke from beginning, expanding according to Marriotte's law and exhausted against a back pressure of 3 pounds per square inch. Required, the *mean effective pressure;* the *effective pressure at end of stroke;* the pressure shown on gauge; the I. H. P. of the engine. $\text{Log } P = A - \frac{B}{T} - \frac{C}{T^2}$; $A = 8.2591$; $\log B = 3.43624$; $\log C = 5.59873$.

2. What must be the steam pressure per square inch on the gauge for the engine, in example 1 to develop the same H. P. when the steam is cut of at $\frac{2}{7}$ of stroke from beginning, instead of $\frac{3}{7}$ (other conditions remaining the same); and how many pounds of injection water at 70° Fahr. are required to condense the steam and maintain the temperature of condenser (feed-water) at 120°. The exhaust steam reaching condenser at 233°. $\text{Log } V = 2.516 - 0.939 \log p$; $V =$ volume of 1 pound of steam; $p =$ absolute initial pressure.

3. The maximum speed of a steamer is 10 knots an hour on a consumption of 20 tons of coal a day. She has to make a voyage of 3000 knots, and steams two-thirds the distance in $10\frac{5}{12}$ days; the remainder of the distance was made at the rate of 7 knots an hour. Required, the *total* consumption of coal during the voyage.

4. One hundred pounds of fuel, composed of 90 per cent. C, 3 per cent. H, 3 per cent. O, 3 per cent. ash, and 1 per cent. water, is burned with 20 pounds air per pound of fuel, at 70° Fahr. The products of combustion escaping up the chimney at 620° Fahr. Thermal value of $C = 14500$ units, and of $H = 50000$ units. Specific heats: $O = 0.218$; $CO_2 = 0.217$; $N = 0.245$; $H_2O = 0.475$. Required, the pounds of water evaporated per pound of fuel from and at 212° Fahr.

5. A steam engine using saturated steam in a jacketed cylinder develops 800 I. H. P. at 60 revolutions per minute with a steam pressure of (p_1) 90 pounds per square inch, absolute; stroke of piston, $3\frac{1}{2}$ feet; terminal pressure, (p_2) 21 pounds; back pressure, (p_3) 3 pounds; temperature of feed water, 120°; effective work per pound of steam, 136015 foot-pounds; foot-pounds due to *external work* at 21 pounds, 56918; volume of 1 pound of steam at 21 pounds pressure, 18.82 cubic feet. The fuel is capable of generating 14000 heat units, and the boiler utilizes 70 per cent. of heat generated. Required, the *pounds of coal* used per hour in the boiler, and area of piston of engine in square inches.

6. The legs of a siphon mercury gauge are to each other in area as 1 : 4. The small steam-pipe connecting gauge with boiler is 5 (h) feet high above surface of mercury in small leg. When pressure is applied, this pipe and that portion of the siphon tube from which mercury has been forced is maintained full of water. How high will the mercury rise in the large leg to indicate 60 pounds pressure? Density of mercury, 13.6; atmosphere, 30″ mercury, or 15 pounds per square inch.

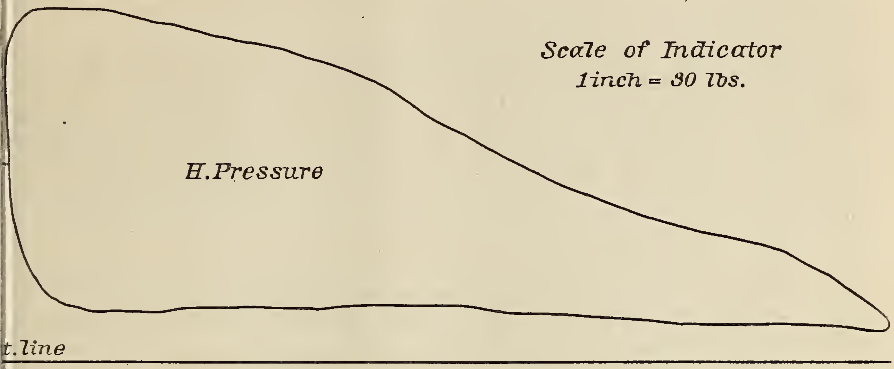
7. Sketch and explain the action of the Bourdon steam-gauge; demonstrate that the radius of curvature of tube varies as the minor axis of its elliptical cross-section.

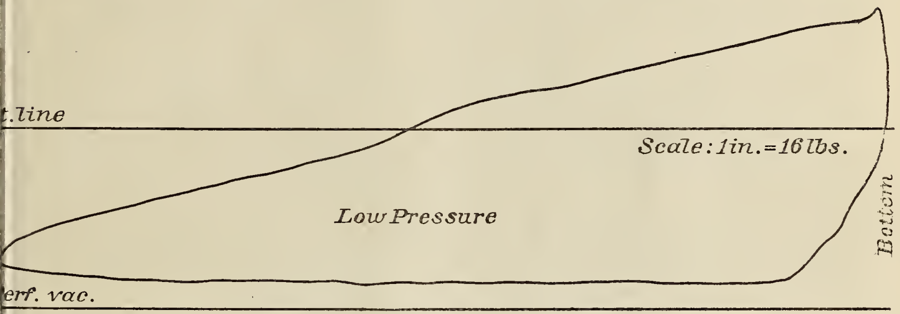
8. The circumference of center of pressure of a four-bladed propeller is 30 feet; distance from hub to center of pressure, 3 feet; pitch of propeller, 20 feet; thrust, 12000 pounds; breadth of blade at hub, 30 inches; the material of which the propeller is made can stand a pressure of 500 pounds per square inch of cross section acting through a leverage of 1 inch. Required, the mean thickness of blade at hub.

9. The water supplied to a boiler has a density of $\frac{\frac{7}{8}}{32}$ and temperature of 110° Fahr.; the water in the boiler is maintained at a density of $\frac{1\frac{7}{8}}{32}$ and temperature 284°. What is the loss by "blowing off"? Suppose the feed water was supplied at a temperature of 140° what would be the per cent. saved in fuel, the density and temperature of water in boiler to remain the same?

10. From the indicator diagrams (marked A and B) and data of a compound engine, and assuming that 15 per cent. of the I. H. P. of engine is absorbed by friction, find the necessary weight to be suspended on the end of a balanced lever of a Prony dynamom-

eter so as to absorb the I. H. P. of engine not used in overcoming friction. Length of lever from center of shaft, 12 feet; diameter of low-pressure piston, 86 inches; diameter of high-pressure piston, 50 inches; stroke of pistons, 3½ feet; revolutions of engine, 55 per minute.





The 1st, 2d, 3d, 4th, 10th, and any three of the remaining five questions are required. Unless all the required questions are attempted, no credit will be given for the two extra ones.

MARINE ENGINES.

CADET-ENGINEERS.

JUNE, 1881.—*Time allowed, five hours.*

PART 1.

1. Deduce the value of the thermodynamic function in terms of the temperature and volume as independent variables, explaining the process?

2. Deduce the law of the variation of the pressure with the volume of any fluid, whether perfectly gaseous or not, inclosed in a non-conducting cylinder?

Deduce the formula for the total heat of gasification, having given

$$\phi = K_\rho \log_\epsilon \tau - \int_0^p \frac{d\,v}{d\,\tau} d\,p$$

4. Deduce the value of the mean gross pressure when $p \propto u^{-\iota}$.

5. Deduce the value of the thermodynamic function for mixed steam and water, and from it deduce the value of the ratio in which steam is expanded in a non-conducting cylinder.

[Answers required to three of the above five questions.]

PART II.

6. The brake (Fig. 1) is applied on the propeller shaft to stop the shaft from revolving when under sail. Required, the weight to be applied at A, in order to stop the shaft when revolving at the rate of 18 turns per minute. The effort to be overcome is 1000 pounds applied at centre of pressure of screw-blade (radius of centre of pressure = 6 feet.) Cofficient of friction = 0.15.

7. Required, the pressure per gauge in the delivery chamber of a feed-pump, to deliver 60 cubic feet of water per minute into a boiler carrying 50 pounds steam per gauge. The feed pipe is 3″ diameter and 40″ long, having 7 right-angled bends in it.

8. Required, the weight of saturated steam per hour for a pair of double-acting condensing engines of 60″ diameter cylinder × 3′ stroke. Cylinders jacketed. Revolutions per minute = 50. Clearance = 3 per cent. of piston displacement. Steam cut off at $\frac{1}{4}$ stroke. Initial pressure of steam = 40 pounds per gauge and its temperature 287° Fahr. No recompression.

9. Required, the per cent. of the steam that would be liquefied if in question 8 the steam had been expanded down to a final pressure of 10 pounds per square inch (absolute pressure), its temperature at that pressure being 194° Fahr., and the cylinders had been non-conducting.

10. The pair of engines in question 8, working under the conditions there stated, except that the mean back pressure is 5 pounds per square inch, used 70 per cent. of the power developed to drive the ship 12 knots per hour (1 knot = 6086 feet). Required, the per cent. of the I. H. P. used to overcome the friction of the thrust-bearing, which consists of a single collar, on which the intensity of pressure is not to exceed 700 pounds per square inch. Diameter of shaft = 10″. Coefficient of friction = 0.05.

11. A pair of double-acting engines (cylinders jacketed) give indicator cards like Fig. 2, and drive the vessel 14 knots per hour. Piston area of each cylinder, 2,000 square inches. Stroke = 4′. Required, the pounds of coal per hour per I. H. P., the total efficiency (boilers, machinery, &c.), and the efficiency of the machinery (engines and propeller), having given the total heat of combustion of 1 pound of coal = 14,000 heat units, and the efficiency of the boiler = .60; resistance of the ship at that speed = 40000 pounds; clearance = 2 per cent. of piston displacement.

[Answers required to five of the above six questions.]

BOILERS.

CADET-ENGINEERS.

JUNE, 1881.—*Time allowed, five hours.*

Design boilers to supply steam for an engine of 2000 I. H. P. that uses 25 pounds of steam per hour per I. H. P.; the boiler pressure to be 60 pounds per gauge; the engine makes 50 revolutions per minnute; volume of one pound of steam at 60 pounds per gauge = 5.7 cubic feet; height of deck-beams from top of boiler keelsons = 13′; breadth of ship that can be occupied by boilers and fire-room = 32′; coal to be burned by natural draught.

1. Required, the total area of grate surface in square feet.
2. Required, the number and size of boilers, and the length of ship occupied by them.
3. Required, the number and size of furnaces in each boiler.
4. Required, the size of back-connection.
5. Required, the size and number of tubes for each furnace.
6. Required, the thickness of metal for shell, furnace flues, and tube sheets.
7. Required, the size of braces used and distance placed apart.
8. Required, the diameter and height of smoke-pipe.
9. Name all the attachments required for the boilers and where attached.

10. Required, the pounds of water evaporated from and at 212° Fahr. by a pound of coal composed of, $C = .92$, $H = .036$, and $O = .028$, burned with 24 pounds of air. Temperature of external air $= 50°$ Fahr. and of products of combustion in chimney $= 600°$ Fahr. Mean specific heat of products of combustion $= 0.241$. Loss of heat from radiation, leakage, &c. $= 20$ per cent. Required, the temperature in the furnace.

The following sketches are required, made to scale and giving dimensions:

1. Longitudinal section through centre of furnace and boiler, showing positions and forms of joints used on shell and in furnace, and how furnace flue is attached to front head and back tube sheet. Also show methods of bracing and attachment to boilers.
2. Front elevations to show positions of furnaces, tubes, and braces.
3. General plan of boilers and fire-room.
4. Write down all formulas explaining the terms used.

DESIGNING MACHINERY.

CADET-ENGINEERS.

JUNE, 1881.—*Time allowed, five hours.*

1. Length of ship on water line, 220 feet; beam, 40 feet; mean immersed girth, 55 feet; coefficient of augmentation, 1.3; displacement, 2,000 tons; area of immersed midship section, 450 square feet; speed, 10 knots per hour; H. P. of engines at that speed, 900. Required, (*a*) area of wetted and augmented surface in square feet; also, coefficient of propulsion. (*b*) Model of above ship is $\frac{1}{16}$ of dimensions of ship. Determine by Froude's law of comparisons the resistance of the model at a speed of 200 feet per minute. Net power required, to overcome resistance of ship $= 40$ per cent. of I. H. P. (*c*) Give coefficients of power for the above ship, on the displacement and immersed midship section.

2. What are the diameters of the high and low pressure steam-jacketed cylinders of a compound engine? Stroke of piston, 4 feet; clearance in each cylinder, $\frac{1}{12}$ of its stroke displacement; I. H. P., 1,000; revolutions per minute, 75; boiler pressure, 76 pounds per gauge; back pressure (minimum) in low-pressure cylinder, 4 pounds; total ratio of expansion, 9; expansion curve $P \propto v^{-1\frac{7}{16}}$; exhaust-valve closes when piston is 8 inches from either end of stroke in each cylinder; compression curve, $p \propto v^{-1}$.

3. Sketch a sectional view of the high-pressure cylinder in question 2, showing steam and exhaust ports, jacket space, piston and cylinder head. Give thickness of cylinder and working lining, depth of piston and cylinder head, distance between heads, width of steam and exhaust ports (single port) in inches.

4. Design a locomotive slide valve for an engine, stroke of piston 3 feet, to cut off at each stroke 27 inches from the commencement; steam-valve to open the port when piston is 1″ from the end of stroke on inboard end; exhaust-valve to close when the piston is 6″ from the end of each stroke; length of connecting-rod, 6 feet; width of port, $1\frac{3}{16}''$; scale for crank-circle and stroke, $1\frac{1}{2}'' = 1'$. Required, steam and exhaust lap and lead at either end of valve, and throw of eccentric; engine direct-acting.

5. Meyer cut-off; stroke of piston, 3′; length of connecting rod, 6′; angle between crank and main eccentric, 120°; between main and cut-off eccentric, 60°; throw of main and cut-off eccentrics, $2\frac{1}{4}''$; width of port in upper part of main valve, 2″; engine direct-acting. What is the length of each cut-off valve, to cut off at $\frac{1}{4}$ stroke from either end of cylinder? Pitch of screw for inboard cut-off valves $= 4$ threads to one inch. What is the number of threads to one inch for the outboard cut-off valve, to cut off at exactly $\frac{1}{4}$ and $\frac{1}{2}$ stroke from either end of cylinder. Sketch relative position of cut-off to main valve when piston is at $\frac{1}{2}$ stroke and valves set to cut off at $\frac{1}{4}$ stroke, giving dimensions.

6. A pair of engines (non-compound) for screw-propeller. Diameter of cylinders,

40″; stroke of piston, 4″; maximum effective pressure in cylinder, 40 pounds; mean effective pressure in cylinder, 30 pounds; cutoff at $\frac{6}{10}$ stroke; cranks at right angles; revolutions per minute, 60. Required, length and diameter of crank-pin; deduce formula for length of crank pin; coefficient of friction, 0.5; limit of work per square inch of pin = 50000; ultimate strength of crank-pin to cross breaking, $d = .04554\sqrt[3]{Apl}$; for $\frac{1}{100}$ deflection, $d = .0707\sqrt[4]{Apl^3}$.

7. An engine of 1,000 I. H. P. uses 20 pounds of steam per I. H. P. per hour; boilers evaporate 8 pounds of water per pound of coal; revolutions, 60 per minute; temperature of injection water, 70°; temperature of discharge water, 100°; temperature of hot well, 110°; temperature of steam as it leaves the cylinder, 212°. Required, number of square feet of condensing surface; diameter of double-acting circulating pump; diameter of single-acting feed-pump.

8. Indicator diagrams (Fig. 1) are taken from a pair of screw-engines with cranks at right angles. Area of each piston, 2,000 square inches; revolutions per minute, 60; piston speed, 480 feet per minute. Weight of reciprocating parts, 4,000 pounds. Angularity of connecting-rod neglected. Find the greatest movement of torsion of the line-shaft.

$$P\alpha = \frac{.00034\,WR^2\,r\cos\theta}{A}$$

DEPARTMENT OF ASTRONOMY, NAVIGATION, AND SURVEYING.

NAVIGATION.

CADET-MIDSHIPMEN.

JANUARY, 1881.—*Time allowed, five hours.*

1. Write formulas to express the relations of the following, viz: (*a*) in plane sailing, of l, p, d, and C; (*b*) in parallel sailing, of L, p, and D; (*c*) in middle-latitude sailing, of D, d, C, and 1_0; and represent these relations graphically. Find the course and distance between two places: (*a*) by a Mercator's chart; (*b*) by middle-latitude sailing, using Bowditch's tables; (*c*) by Mercator's sailing, using the tables.

2. Deduce formulas for finding the course, distance, and positions of the vertex and other points, upon the great circle joining two places.

3. Find the hour angle of a heavenly body when it is nearest to or on the prime vertical, considering three relative values of L and d; and then the local mean time, in the case of the sun, and in the case of a star, each bearing east.

4. Deduce formulas for finding the latitude from an altitude of a heavenly body observed at any time. What are φ, φ', and φ'', and what determines the sign of each? How is the altitude corrected, and the hour angle found, in the case of the moon?

5. Referring to question 4, find the effect upon the latitude of an error in the altitude, and of an error in the time, and show in each case when the effect will be greatest and when least.

6. Deduce the formula for the reduction to the meridian, and state how the latitude is found. Sin 1″ = 0.000004848. Explain the restrictions of this method.

7. January 1, the chronometer error is $1^h\ 23^m\ 37^s$ slow, and the daily rate $1^s.7$ gaining. On March 2, the error is $1^h\ 22^m\ 01^s.5$ slow, and the rate $1^s.1$ gaining. Find the error on January 25 (to nearest $0^s.1$).

8. Deduce the equation of equal altitudes. Explain the manner of observing the sun, and each subsequent step in order to find the error of the chronometer on Greenwich mean time.

9. In the method of two altitudes of the sun for latitude, draw a figure, and name the triangles in the order in which they are solved, noting the parts known and required in each. How is t found in case of a star being observed?

10. Find the position by Sumner's method, the ship having moved between the observations. What determines the interval which should elapse between observations of the same body? What is the use of a single line of position?

NAVIGATION.

CADET-MIDSHIPMEN.

JUNE, 1881.—*Time allowed, nine hours.*

1. What determines the selection of the principal stations of a survey? How is the astronomical bearing of a base-line determined by sextant and chronometer? Deduce the formulas.

2. Correct the collimation error in the bureau theodolite. Run in the shore-line between two stations, using a sextant.

3. To what plane should all soundings be reduced, and how is the reduction effected? How should you determine your position when sounding, and plot it on the chart? What must be your position with reference to the *great* circle, in order that a sounding may be accurately plotted?

4. Explain and illustrate by a figure the polyconic projection. Deduce the general equations of a meridian. State the characteristic features of the polyconic chart, and the advantages of the projection over the Mercator's projection for surveying purposes.

5. What is a running survey? What is an astronomical base? What is meant by "balancing the work," and how is it done?

6. Given $X' = X + aX + bY + cZ + P$ . . . . . . (1)

$Y' = Y + dX + eY + fZ + Q$ . . . . . . (2)

$Z' = Z + gX + hY + kZ + R$ . . . . . . (3)

Explain what these equations represent, and the meaning of each term of the third equation.

7. Transform the first two equations so as to give the force of earth and ship to head, and the force of earth and ship to starboard, each in terms of the earth's horizontal force. Explain the further transformations to obtain the equation

$$\delta = A + B \sin \zeta' + C \cos \zeta' + D \sin 2\zeta' + E \cos 2\zeta'.$$

8. Explain each term of the preceding formula. Under what circumstances will A and E reduce to zero? What is the "starboard angle"? Find its value and the maximum value of the semicircular deviation in terms of the coefficients.

9. Explain the causes of the heeling error, and show in what direction it usually acts. Show how the heeling error may be corrected mechanically, placing the magnet at its proper distance from the compass.

10. Explain the construction and use of a Napier's diagram. Explain the practical correction of the semicircular deviation by the use of a single magnet, and by two magnets.

[One question may be omitted.]

Nine of the above having been discussed, extra credit will be given for answers to the following:

Extra question.

Given $$\frac{H'}{\lambda H} \sin \delta = A + B \sin \zeta + C \cos \zeta + D \sin 2\zeta + E \cos 2\zeta,$$

$$\frac{H'}{\lambda H} \cos \delta = 1 + B \cos \zeta - C \sin \zeta + D \cos 2\zeta - E \sin 2\zeta.$$

Deduce the equations of an epitrochoid, and then explain the construction of the dygogram which they represent. Explain, also, the construction of the dygogram as a limaçon.

Second day.

11. June 1, 1881. (*a*) Find the time of a. m. high water at Sandy Hook, in Long. 74° W. Establishment of port, $7^h\ 29^m$. (*b*) Same date, at Annapolis. Lat. 38° 58′ 53″ N., Long. $5^h\ 5^m\ 56^s.5$ W. Required, the local mean time of sunrise, supposing 5^m to be the time it takes the sun to rise in altitude equal to its semi-diameter, the refraction, dip, &c. (*c*) Same date, at Annapolis. Find the local mean time when the star α Aquilæ (Altair) will be on the prime vertical east.

12. June 1, 1881, at Annapolis. Observed equal altitudes of the sun a. m. and p. m.: a. m. W. T. obs. $7^h\ 35^m\ 10^s$; a. m. C—W $3^h\ 25^m\ 0^s$; p. m. W. T. obs. $4^h\ 26^m\ 0^s$; p. m. C—W. $3^h\ 24^m\ 30^s$. Required, the error of chronometer on Greenwich mean time.

13. June 2, 1881. Lat. D. R. 25° 0′ S. Long. about 87° 50′ E. W. T. obs. $11^h\ 55^m\ 30^s$; C—W $5^h\ 50^m\ 20^s$; c. c. $+0^h\ 30^m\ 30^s$. Obs. alt. moon's lower limb 20° 0′ 0″ bearing NE'ly. In. cor. +2′ 0″. Height of eye, 20 feet. Time, about noon. Required, the longitude.

14. June 2, 1881. Lat. about 37° N. at about 8 p. m. W. T. obs. $8^h\ 08^m\ 05^s$; C—W $0^h\ 05^m\ 30^s$; c. c. $+4^h\ 32^m\ 49^s$. Obs. altitude of the star a Virginis (Spica) 42° 41′ 0″ bearing S'ly. In. cor. +2′ 0″. Height of eye, 20 feet. The Long. by obs. at 4 p. m. was 67° 0′ W., and the run from 4 p. m. until the time of this observation was 15 miles SE. (true). Required, the latitude by the circum-meridian altitude method.

Extra question, the above having been solved.

Adjust a transit instrument in azimuth.

$$\text{Given } \tau = b\,\frac{\cos(L-d)}{\cos d} + a\,\frac{\sin(L-d)}{\cos d} + \frac{c}{\cos d},$$

find the level, collimation, and azimuth constants. Having done so, how should you proceed to the exact determination of time?

DEPARTMENT OF PHYSICS AND CHEMISTRY.

ELECTRICITY.

JANUARY, 1881.—*Time allowed, four hours.*

[Ten questions required.]

1. Define difference of potential. Electrical potential is one factor of energy; what is the other factor?

2. Prove mathematically that the capacity of a sphere removed from all conductors is equal to its radius. To what potential, if it were possible, must we charge a sphere of 1 metre in diameter, in order that its electrical density may be unity?

3. What is meant by the specific inductive capacity of a dielectric? How great a charge would a condenser take, with plates 1^{mm} apart, of 1 square metre surface, and electrified by a thousand Daniel's cells, the plates being separated by gutta-percha, specific inductive capacity 4.2? E. M. F. of each cell, .00974.

4. What couple is expressed by *mlH?* At a magnetic station, the total magnetic intensity was 10.28 British units, and the inclination 68° 9′. What was H. (horizontal intensity) in British units, also in C. G. S. units?

5. When the deflected needle of a tangent galvanometer is in equilibrium, what forces are acting upon it, and what are the expressions for their moments? Is it necessary that the needle should be highly magnetized or not? (Give reasons for answer.)

6. State Ohm's law. Derive formula for the arrangement of a battery to obtain greatest effect. Prove mathematically that in any given combination the maximum effect is obtained when the total resistance in the elements is equal to the resistance of the interpolar.

7. The current from 10 exactly similar cells, in series, produces a deflection of 45° in a tangent galvanometer, the external resistance of the circuit being 10 ohms. If

arranged so that there are 5 couples of 2 cells each, a deflection of 33° 42′ is produced. Required the internal resistance of a cell.

8. Explain the principle of Farmer's dynamo-electric machine, also the commutator. Make a drawing and explain fully the torpedo-firing key-board used in the service.

9. The current necessary to fire a torpedo fuze is .6 weber; the resistance of the fuze is 1 ohm, and that of the leading wires 2 ohms; what the smallest number of cells of E. M. F. 1.2 volts and $R=2$ ohms required to fire a torpedo, and how must they be arranged?

10. The poles of a battery, resistance 15 ohms, are joined by two wires in multiple arc; the first wire contains 2 fuzes of .5 ohm's resistance each, and leading wires 4 ohms; the second wire contains 4 fuzes of .5 ohm's resistance each, and leading wires 6 ohms. What must be the E. M. F. of the battery to fire all fuzes simultaneously, if it takes .5 weber to ignite a fuze?

11. Derive formula for the resistance of the shunted galvanometer. What part of C flows through the shunt, and what through the galvanometer? What is "*U*"? A certain galvanometer has a resistance of 246 ohms, and it is required to provide it with a $\frac{1}{50}$th shunt; what must be the resistance of the shunt?

12. Define ε electro-chemical equivalent. A current from a battery of 70 Grove's cells in series was sent for 24 hours through an external resistance of 3,200 ohms. E. M. F. of each cell, 1.8 volts. $R=.9$ ohm. Required whole amount of zinc consumed in the entire battery during that time.

13. A short cable, 9 miles long, was laid across the lake, and its ordinary resistance was 81 ohms. On testing one morning A found that with B insulated the line gave 30 ohm's resistance; then B tested with A insulated, and found a resistance of 60 ohms. How far out from A must a boat go to get at the fault?

DEPARTMENT OF MECHANICS AND APPLIED MATHEMATICS.

STRENGTH OF MATERIALS.

CADET-ENGINEERS.

JANUARY, 1881.—*Time allowed, four hours.*

1. (*a*) A body weighing W pounds and moving with a velocity of V feet per second is connected with another body at rest and weighing W pounds, by a chain l feet in length and a square inches in sectional area; find the greatest stress on the chain, its inertia being neglected.

(*b*) In launching a ship a weight of five tons, intended as a drag, is attached to the ship by means of a chain 100 feet long and 8 square inches in effective sectional area; find the greatest pull on the chain, supposing the ship to have an inertia equivalent to that of a weight of 400 tons moving with the same velocity, and supposing this velocity to be 20 feet per second at the instant the drag begins to act, E being 25,000,000.

2. (*a*) Find the shortest rod that will bear without injury the shock occasioned by a weight of W pounds which falls through h feet before it begins to strain the rod, E, R, and the sectional area (a) in inches being given.

(*b*) Find l when $W=60$ pounds, $h=12$ feet, $E=30,000,000$ pounds, $R=15$ foot-pounds, and $a=0.25$ square inch.

3. (*a*) The principal stresses p and q being given, find the intensity and direction of the resultant stress on a plane inclined at an angle θ to the plane of greatest principal stress.

(*b*) Find r and γ, when $p=255$ pounds, $q=171$ pounds, and $\theta=27°$.

4. (*a*) A cord suspended from two points not in the same vertical line sustains a uniform vertical load; find the equation of the curve in which the cord hangs, and the length of the arc measured from the vertex.

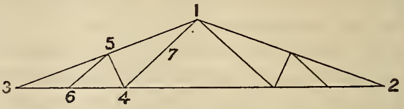
(*b*) Find a convenient approximate expression for the length of the arc.

5. (*a*) Deduce the equation of the curve in which a cord of uniform sectional area hangs, when it is suspended from two points and sustains only its own weight.

(*b*) Find the intensity and direction of the strain on the points of support.

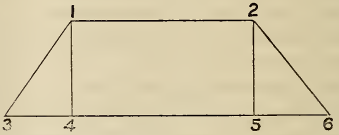
6. (*a*) The pressure on a semicircular area varies directly as the square of the distance from the diameter; find the centre of pressure.

(*b*) The truss given in the diagram is uniformly loaded; find the stress on the beams 54, 43, 35, and 51.



7. (*a*) Find by the method of polygons, the stresses upon the beams of the frame indicated in the diagram.

(*b*) Find the same stresses by the method of sections.



8. (*a*) Derive a formula for determining an area by means of Amsler's polar planimeter.

(*b*) Find the moment of friction in the case of a spherical step.

THE METHOD OF LEAST SQUARES (ELECTIVE).

MONTHLY EXAMINATION.

APRIL, 1881.—*Time allowed, $2\frac{1}{2}$ hours.*

Cadet-Engineers J. M. Whitham, G. Kaemmerling, B. C. Sampson, J. E. Byrne, C. H. Mathews, K. McAlpine, W. S. Smith, F. B. Dowst, De W. C. Redgrave, and W. W. White.

1. Prove that the probability of the concurrence of several independent events is equal to the product of their separate probabilities.

Deduce the equation of the probability curve.

2. The measurement of an angle is repeated twenty times with the same theodolite; the mean of six readings is $27^\circ\ 34'\ 32''$; the mean of ten readings is $27^\circ\ 34'\ 40''$; and the mean of the remaining four readings is $27^\circ\ 34'\ 48''$: find the adjusted value of the angle and its probable error.

3. Given the following equations of observation; viz.,

$$x-y+2z=3\ (\text{weight } 1),\qquad 4x+y+4z=21\ (\text{weight } 1),$$
$$3x+y-5z=5\ (\text{weight } 1),\qquad -2x+6y+6z=28\ (\text{weight } \tfrac{1}{4}):$$

find the probable value and the weights of x, y, and z.

4. From a central station the following angles were measured between the points A, B, C, and D; viz.,

$$AB\ 65^\circ\ 11'\ 52''.500\ (\text{weight } 3),\qquad CD\ \ 87^\circ\ \ 2'\ 24''.703\ (\text{weight } 3),$$
$$BC\ 66^\circ\ 24'\ 15''.553\ (\text{weight } 3),\qquad DA\ 141^\circ\ 21'\ 21''.757\ (\text{weight } 1):$$

find the adjusted values of the angles.

5. The three angles of a spherical triangle were measured and the following results obtained; viz.,

$$A=58^\circ\ 46'\ 5''.46\ (\text{weight } 4),\quad B=52^\circ\ 16'\ 22''.32\ (\text{weight } 5),\quad C=68^\circ\ 58'\ 8''.00\ (\text{weight } 3);$$

the spherical excess being $38''.36$, find the adjusted values of the angles.

THEORETICAL NAVAL ARCHITECTURE (ELECTIVE).

JUNE, 1881.—*Time allowed, three hours.*

Cadet-Midshipmen J. L. Schock, J. H. Linnard, J. J. Woodward, J. A. Hoogewerff, W. H. Stayton, H. K. White, J. L. Rees, F. C. Rider, and T. Serata.

1. Derive the finite-difference series, and by means of this series obtain a rule for computing areas when the number of ordinates is a multiple of 5. When does this rule give exact results?

2. Derive Dr. Woolley's rule for computing volumes, and also his rule for moments.

3. Find general expressions for the moment of a wedge whose inclined faces are two water planes; first with reference to a vertical plane through its edge, and secondly with reference to one of its inclined faces.

4. The load-water line of a ship consists of a pair of sinusoids forward, and a pair of prolate cycloids aft, with a straight middle body; the length of the ship being l, and the length of the fore body l_1, the length of after body $\frac{2}{3} l_1$, and the midship breadth b, find the coefficient of fineness.

5. Derive an expression for the height of a fixed metacentre. When the metacentre is not a fixed point, define the metacentric locus.

6. Define dynamical stability, and dynamical surface stability: derive an expression for each, and show that the former is the integral of the statical stability.

7. Prove that a vertical section of the surface of a rolling wave is a prolate cycloid; find the radii of the generating and of the rolling circles, and determine the point of inflexion.

8. Derive the formula for computing the augmented surface of a ship, and show how this formula may be employed to determine approximately the engine power necessary to give a ship the speed due to her length.

9. (*a*) Derive a formula for ascertaining the change of trim caused by moving a weight P a distance l, forward or aft.

(*b*) Determine the angle of maximum efficiency for a rudder, when the power applied is limited.

DEPARTMENT OF ENGLISH STUDIES, HISTORY, AND LAW.

INTERNATIONAL LAW.

MONTHLY EXAMINATION.

FEBRUARY, 1881.—*Time allowed, two hours.*

1. (*a*) Explain law, law of nature, international law, municipal law, public law, statute law, common law. (*b*) Explain the two phases of international law, (1) as an abstract system, (2) as a positive code.

2. State the essential points in the Monroe doctrine. Explain its origin, its authority, and its application. Discuss the correctness of the doctrine.

3. What are the three essential attributes of states, and in what does each of them consist? Show, with examples, how one or more of them may exist in a modified form.

4. Explain fully the relation of aliens to the government of the country in which they are residing.

5. State the circumstances in the case of the Franconia, and the conclusions reached in the English courts.

6. What are the jural rights, so called, that pertain to states; the moral claims? How far can the latter be said to form the grounds of international law?

INTERNATIONAL LAW.

MONTHLY EXAMINATION.

MARCH, 1881.—*Time allowed, two hours.*

1. State the extent of the exemption from local jurisdiction in foreign territory or in foreign ports of (1) foreign sovereigns, (2) foreign armies, (3) ships of war, (4) merchant vessels, (5) the crews of public or private vessels. What is the rule of law in France on this subject?

2. Name all the ship's papers required by international law. Describe those required by municipal law alone.

3. Explain the difference between a domiciled foreigner and a foreigner that has been naturalized. Define naturalization, expatriation, denizen (in England), alien. What change was made in the English law in regard to nationality in 1870?

4. Discuss the immunities of the residence of a diplomatic envoy.

5. State the duties of consuls.

6. State the reasons for beginning a war with a declaration. What is the rule of law as to (1) enemy's persons found in the country at the outbreak of war, (2) enemy's property, (3) private debts due to enemies, (4) public debts due to enemies?

INTERNATIONAL LAW.

MONTHLY EXAMINATION.

APRIL, 1881.—*Time allowed, two hours.*

1. Discuss the question whether the British proclamation of neutrality, in 1861, was an unfriendly act.

2. Define postliminy, salvage, *relâche forcée,* spy, *commercia belli,* special and general truce.

3. Name the four recognized restrictions upon neutral trade during war. What general power is given to belligerents in order to carry into effect these restrictions?

4. What is a privateer? State the usual restrictions placed by municipal law upon privateering. What ground was taken by the United States in regard to the clause of the Declaration of Paris relating to privateering, and what reasons may be assigned for the American position?

5. "When an internal war breaks out, the government must determine whether the municipal or the international code, in whole or in part, shall be adopted." Explain what is meant by the two "codes," give reasons for the adoption of either one, and the consequences flowing from it, as to belligerents and as to neutrals.

6. War between United States and Spain. In command of the U. S. S. Trenton, cruising in the Atlantic, you search the following vessels: (1) The Spanish brig Carmen, sailing to New York under a license from the United States consul at Cadiz; (2) the Spanish ship Asturias, bound to the same port, with olive-oil and hemp, under a license from the admiral commanding the squadron to which the Trenton belongs to carry a certain quantity of hemp to New York; (3) the Norwegian bark Olaf, from Cadiz to Gottenburg, under a license from the Spanish government. Discuss the cases.

7. Later, you are lying in the roads of Brest, and a powerful Spanish iron-clad is lying outside. Late in the evening, as your steam-launch is bringing off the mail, she is surprised and captured by boats from the Spaniard. What will be the result? Some time after, the Spanish capture two American merchantmen. One of them, the Anna, is carried into Lisbon and condemned by a prize-court sitting there. The other, the Rapid, is carried into Bordeaux, and condemned by a prize-court in Barcelona. Both are sold to Frenchmen, and afterwards come, under the French flag, to Baltimore. The respective owners put in claims for the vessels. Discuss.

INTERNATIONAL LAW.

JUNE, 1881.—*Time allowed, three hours.*

[Starred questions are alternatives.]

1. Define international law, private international law. Define domicil, embargo' retorsion, rule of *uti possidetis,* exequatur, efficient blockade.

2. Explain naturalization, and state how it is obtained in the United States. Discuss the principles involved in the case of Koszta.

3. Name the ship's papers required by both international and municipal law, and those required by international law alone. Describe any four of them.

4. State the principal arguments for and against the right of capture, during war, of private property at sea, as distinguished from private property on land.

4.* What is piracy by international law? How and where is it punishable? When the municipal law of a State enlarges the definition of piracy, to what persons does the enlarged definition apply, and where may they be tried? What considerations governed the cases of Confederate ships of war?

5. When does the State acquire title to a prize taken at sea? When may the title pass to individuals? What is the effect of this fact in the case of subsequent recapture of the prize? What limitations exist in regard to the nationality of a prize-court? in regard to the locality of the prize-court? in regard to the locality of the prize? What courts have jurisdiction of prize cases in United States? In England?

6. Classify the various kinds of contraband goods. How far is the destination of goods a test of their contraband character? State in full the distinctions drawn, as to ship and cargo, in adjudging upon a neutral the penalty for carrying contraband. Explain the doctrine of continuous voyages, as applied by the Supreme Court during the civil war.

6.* Explain in full the distinction between blockade *de facto* and blockade by notification. What two elements are necessary to complete the offense of breach of blockade? In what ways may this notice be given, or be presumed to have been given? State the rule in regard to notice laid down in the President's proclamation of 1861, and explain the interpretation that was put upon it.

7. (*a*) War between the United States and Spain. In command of the U. S. S. Vandalia, cruising in the Atlantic, you speak a vessel carrying German colors; you request her to heave to, but she continues on her course. What steps do you take? The German ship being brought to, she fires a volley of small arms into the boarding officer's boat as it approaches her. The search shows nothing of a suspicious character connected with the German vessel. What will you do, and what consequences will flow from your action? (*b*) Later, you fall in with a fleet of French merchantmen under convoy of a man-of-war of about your own strength. You attempt to search the merchantmen, when you are fired into by the man-of-war. Results? (*c*) You capture a Spanish brig near the Azores. You find that she is in an unfit condition to go to the United States, though she might be made seaworthy by being thoroughly repaired. She has a general cargo, with a large amount of specie. What course will you pursue, and what considerations will govern your decision? Supposing that the vessel were a neutral, carrying contraband, how would that affect the case?

8. (*a*) Later, you capture a Swedish brig, in the Bay of Biscay, carrying timber to Ferrol, where there is a Spanish dockyard. You find, on making search, that she had been previously captured by the Kearsarge and ordered to Savannah for adjudication; but that on the voyage the Swedish master and seamen overcame the prize, crew, set them adrift in the neighborhood of Brest, and renewed the original voyage. What would you do, and what consequences would flow from your act? Supposing that the original voyage were held to be innocent, how would that affect the case? (*b*) You overtake an Italian steamer, carrying Spanish troops from Cadiz to Havana. The master says his ship was seized by the authorities at Cadiz, and that he was compelled by force to undertake the voyage. You have every reason to believe his statement. Results? (*c*) Subsequently, the Vandalia is on blockade duty, the whole coast of Cuba being under efficient blockade. You search an English steamer heading for Santiago de Cuba. She had cleared from Liverpool for Vera Cruz with a cargo of rifles, saltpetre, and lead. The master states that he was putting into Santiago in distress, being out of water. He had previously made no attempt to speak the blockading squadron, and was only brought to after several shots. Results?

DEPARTMENT OF MODERN LANGUAGES.

SPANISH.

JUNE, 1881.—*Time allowed, three hours.*

Translate the following in Spanish.

1. Parlez-vous l'espagnol?
2. Je le parle un peu.
3. Qui vous donne des leçons?
4. C'est Monsieur X.
5. Combien de leçons par semaine vous donne-t-il?
6. Seulement deux.
7. Ce n'est pas assez, mais vous avez une bonne prononciation.
8. Il faut bien travailler pour apprendre une langue.
9. Je suis le premier de ma classe.
10. Je le sais, vous étudiez beaucoup.
11. Savez-vous que nous étudions aussi la géographie et l'histoire en espagnol?
12. Non, Monsieur, dites moi quelque chose de ce que vous savez.
13. Avec plaisir.
14. L'Espagne est un beau pays, elle se trouve divisée actuellement en quaranteneuf provinces. Celle de Madrid a deux cent vingt-cinq bourgs et villages.
15. Madrid capitale du royaume à 300,000 âmes, neuf théâtres, plusieurs fontaines, et de belles promenades.
16. Séville est une des plus belles villes de l'Espagne.
17. Charles premier a été proclamé roi d'Espagne en 1516, et peu de temps après empereur d'Allemagne sous le nom de Charles quint, lequel fut longtemps en guerre avec François premier, roi de France.
18. Vous racontez très-bien, vu qu'il y a si peu de temps que vous apprenez l'espagnol.
19. Vous êtes très aimable, car il n'y a que quatre mois que j'étudie l'espagnol.

Translate into French.

NAPOLEON AND WASHINGTON.

Napoleon had just been installed as First Consul, at the palace of the Tuileries, where everything still breathed the recollections of its ancient kings, when he learned the news of the death of Washington. The First Consul, to show his respect for the magnanimous character of the hero of the American Republic, announced his death to the consular guard and to all the troops of the French Republic in the following order of the day: "Washington is dead! This great man fought against tyranny; he established the liberty of his country. His memory must always be dear to the French people as well as to all free men of both worlds, and especially to the French soldiers, who, like him and his American troops, fight in defense of liberty and equality. In consequence the First Consul has ordered that, for the space of ten days, black crape shall be hung on all the colors and standards of the Republic."

FINAL EXAMINATION.

MAY, 1881.

CADET-MIDSHIPMEN—CLASS OF 1879.

NAVAL TACTICS.

Time allowed, three hours.

1. How should a fleet of 24 vessels be arranged, and how should the command be istributed? Where should the divisional and squadron commanders be found? Of what ships is the reserve division composed?

2. Give a diagram of the three formations of a fleet. State the order of battle for rams, torpedo boats, and for broadside vessels. What is meant by the fleet being in close order, open order, and half distance when in line, and also in double column?

3. When is a fleet in natural order and when in reverse order? How is the guide vessel distinguished? In case the guide vessel is disabled what vessel takes her place? By whom is the rate of speed regulated, and what is known as steerage-way?

4. The fleet being in column of vessels, in natural order, form it into triple column.

5. The fleet being in double column, in natural order, form it into triple column.

6. The fleet being in columns of vessels abreast by divisions, heading north, change direction to the rear on any course from south to west.

7. The fleet under sail, close-hauled, what rules govern the speed and sailing of the guide vessel?

8. Change from columns of vessels abreast by division to a single column of vessels on the other tack, with the weather division leading.

9. How do you signal latitude and longitude and variation of the compass?

10. How do you signal a vessel's number? her private number?

SEAMANSHIP.

Oral—Specimen Questions.

I.

1. How do you let go a bower anchor? Describe fittings, &c.

2. Cut and fit lower mast-head pennants, wire rope.

3. As midshipman of the watch at night, you are ordered to see a second anchor ready for letting go; state how you would make the examination.

4. The ship being in irons, recover her on the old tack.

5. Riding to a coast current by the starboard anchor, wind four points on the starboard bow, weigh and stand out, the shore being close aboard on the port beam. (No spring to be used.)

6. The weather sheet and clewline of maintopsail being carried away, what is to be done?

7. Sailing-vessels meeting, wind S. by E., one steering N. by W., the other NNW., which has the right of way?

II.

1. While at anchor in a strong tide, hoist a quarter-boat.

2. Cut and fit topmast pennants, wire rope.

3. Weigh a heavy anchor with a service launch.

4. Set a jib, blowing fresh.

5. Wind on the starboard quarter, all drawing sail set, you are struck by a squall; how do you proceed?

6. Going before the wind, the mizzen topgallant parrel is carried away; what must you do?

7. Sailing-vessels meeting, wind N., one steering ENE., the other W.; which has the right of way?

GUNNERY.

Time allowed, six hours.

1. Define *explosion*. Upon what, in general, do the effects of explosion depend? How do special circumstances modify the effects of explosion. Define *detonation*. What substance is usually employed in producing detonation, and upon what does its efficiency depend? Define *explosive mixture*, also *explosive compound*, and name the explosive bodies under each head, which are of practical value.

2. State proportion of ingredients in United States Navy gunpowders. Classify the

different forms of gunpowder used in the Navy, according to the size of the grain. For what are the large-grained powders used? Explain the principles governing the granulation of gunpowder.

3. What is a *sytem of rifling*? Explain how the rifled motion is given to a projectile. What systems of rifling are in general use?

4. What are the different kinds of strain to which a gun is subjected? What method of equalizing the strains is employed in the construction of heavy ordnance?

5. What considerations govern the distribution of a ship's crew at quarters? How are they distributed in relation to watches? How are they stationed at pivot and broadside guns? turret guns? How are gun-captains selected? How are boarders and riflemen organized and armed? firemen? wreck-clearers? sail trimmers?

6. Give the stations of a crew at a M. L. shifting pivot gun working with tackles—24 men and a powderman. Give the titles on the right and left of the gun in their order.

7. How is powder stowed in the magazine? Describe the arrangements for supplying the battery with powder. Where should the scuttles be placed?

8. Draw and give nomenclature of VIII–in, M. L. R.

9. What fuzes are used in the service? Describe the Borman fuze.

THEORY OF NAVIGATION.

Time allowed, five hours.

1. (a) Adjust the horizon glass of a sextant. (b) Describe the azimuth circle of a Ritchie compass, and the manner of using it to find the compass bearing of the sun. (c) State two ways of taking a departure, and note their relative accuracy. What entry in the log, in each case, and what use of the departure, should you make? (d)* Find the local mean time of sunset (disappearance of upper limb).

2. (a) Running parallel to the shore at a certain speed, how may its distance be found? (b) Given the compass bearing of the port, the speed of the ship, and the set by compass and hourly drift of the current, find the course to be steered. (c) What is the chief source of error in taking an altitude of a heavenly body above the sea horizon? (d)* Find the local mean time when a given bright star will be on the prime vertical east, and state the use of this knowledge.

3. (a) What is the three point problem? Show how it is solved by a geometrical construction, and by a station pointer. (b) When you desire to observe the altitude of a bright star, how may its name be ascertained? (c) What is the most exact method, and what the usual method, of fixing an anchorage? What entry is made in the log, in each case, and why? (d)* Find the great-circle course and distance between two places, by Napier's rules.

4. (a) Find the course and distance between two points on a Mercator's chart, and give the reasons for each. (b) Find the same by inspection of the tables (Mercator's Sailing). (c) Adjust the azimuth plates of a theodolite in order that they shall move in a horizontal plane. (d) Measure a base-line with the means usually found on board ship.

5. (a) Obtain and plot soundings. (b) Describe the construction of a polyconic chart, and state its advantages for particular purposes. (c) Draw an astronomical triangle, and note the parts given and required in the $\phi'' \phi'$ method for latitude. (d) Using the sun, bearing SSE., how is the hour angle found?

6. (a) Show what ϕ, ϕ', and ϕ'' mean, and how they are marked. (b) Using the moon, bearing SSE., how is the hour angle found? (c)* In this problem, show analytically when the effect of an error in the hour angle will be greatest and when least. (d) Show the same graphically, upon the principle of Sumner's method.

7. (a) In Sumner's method, allow for an uncertainty in the chronometer correction. (b) Describe in detail, and noting all precautions, the observations for finding the error and rate of a chronometer by single altitudes of the sun, using an arti-

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* Formulas required.

ficial horizon. What are the advantages and disadvantages of this method? (*c*) Describe particularly the observations in the method of equal altitudes of the sun (a. m. and p. m.) for chronometer rate and error. What are the advantages and disadvantages of this method? (*d*)* Explain each quantity in the formula and each step in computing the chronometer error on Greenwich mean time.

8. (*a*) Explain the process of finding the deviations of the compass, either by bearings of a distant object, or by the plane-table method. (*b*) Explain the causes in iron ships of constant, semi-circular, and quadrantal deviation and heeling error. (*c*) Explain the construction and use of a Napier's diagram. (*d*) What is the effect of a change in the ship's position in magnetic latitude upon the semi-circular deviation, quadrantal deviation, and heeling error? and state with regard to any one of these why it is changed or is not changed.

9. (*a*) Explain the construction of the dygogram as a limaçon. (*b*)* What is the mean thread of a transit instrument? How are the equatorial thread intervals determined? (*c*)* Explain by a figure the reduction to the meridian, deducing Mayer's formula. (*d*) Describe briefly the parts of a zenith telescope.

[Question 9 is extra, and additional value will be given it, provided the others have been discussed.]

PRACTICAL NAVIGATION.

Time allowed, five hours.

Each cadet will take observations with the sextant and artificial horizon, as follows (questions 1 and 2):

1. One set of five altitudes of the sun for the chronometer error on G. M. T. and the error of the compass. The mean of the set must be used in the computation.

2. One set of five sights, using the sun and a chronometer whose error is known, for the astronomical bearing of an object upon the opposite bank of the Severn River. The height of the observer's feet above the sea level is 19 feet. The apparent altitude of the object must be found and considered. Distance [from the observer] of the shore line below and in the same vertical circle as the designated object, 3,300 feet. Use mean of observations.

3. May 20, 1881, at noon, Cape Race—Lat. 46° 40′ N., Long. 53° 07′ W.—bore by compass W. by N., distant 11 miles, the ship's head being NE., and the deviation for that course 17° 0′ E. Variation from chart, 30° 0′ W. Ship then sailed as follows until noon, May 21.

Compass courses.	Knots.	Winds.	Leeway.	Deviation.
E. S. E.	32.2	South.	7°	13° 0′ E.
S. E.	25.6	S. S. W.	8°	5° 0′ E.
S. E. by S.	33.8	S. W. by S.	6°	2° 45′ E.
S. by W.	25.7	S. E. by E.	8°	8° 30′ W.
N. E. by E.	31.8	do.	6°	18° 0′ E.
S. W.*	34.8	do.	None.	9° 15′ W.

*Run until noon from hour of morning time-sight, May 21.

May 21, 1881. Obs. merid. alt. $\underline{\odot}$ 64° 33′ 50″, bearing S. In. cor. + 1′ 30″. Height of eye, 18 feet. Required, Lat. and Long. by D. R. at noon, May 21, 1881; Course and distance by D. R. from Cape Race; Lat. by observation.

4. About 7 a. m., May 21, 1881. W. T. obs. $7^h\ 01^m\ 23^s$, C–W. $7^h\ 03^m\ 12^s$, c. c. $-3^h\ 42^m\ 10^s$. Obs. alt. $\underline{\odot}$ 20° 16′ 20″. In. cor. + 1′ 30″. Height of eye, 18 feet. Compass bearing of sun, N. 122° 15′ E. Ship's head NW. by W. Required, Long. at noon, May 21, 1881; deviation of the compass; set and drift of the current.

5. December 21, 1881, at Mauritius. Lat. 20° 22′ 36″ S.; Long. 57° 45′ 42″ E. Equal

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*Formulas required.

altitudes of the sun. A. m., Chro. T. obs. $3^h\ 30^m\ 51^s$; p. m., Chro. T. obs. $0^h\ 47^m\ 32^s$. Required, error of the chronometer on Greenwich mean time.

6. At 6 p. m., May 21, 1881, ship in South Atlantic, in Lat. 15° 20′ 30″ S., thence runs 90 miles SW. by S. by compass, the compass error being 1 point westerly, and about 4 a. m., May 22, 1881, the altitude of the moon, bearing easterly, is observed as follows: W. T. obs. $4^h\ 02^m\ 13^s$, C–W. $2^h\ 9^m\ 15^s$, c. c. — $0^h\ 23^m\ 27^s$. Obs. alt. ☽ 25° 16′ 20″. In. cor. + 1′ 30″. Height of eye, 18 feet. Required, the longitude.

7. May 18, 1881, in morning twilight, in Long. 43° 34′ 17″ W., observed altitude of star μ Aquarii, as follows: W. T. obs. $3^h\ 38^m\ 42^s$. C–W. $6^h\ 02^m\ 24^s$, c. c. — $2^h\ 45^m\ 24^s$. Obs. alt. ✱ 63° 32′ 20″ bearing southward and eastward. In. cor. + 1′ 30″. Height of eye, 18 feet. Required, the latitude.

8. May 19, 1881, about 4 a. m., in Long. 135° 12′ 18″ E. W. T. obs. $4^h\ 1^m\ 12^s$, C–W. $3^h\ 3^m\ 33^s$, c. c. — $0^h\ 4^m\ 45^s$. Obs. alt. a Ursae Minoris (Polaris) 30° 16′ 10″. In. cor. + 1′ 30″. Height of eye, 18 feet. Required, the latitude.

Which tide of the day will be the higher at Mauritius, Lat. 20° 22′ 36″ S., Long. 57° 45′ 42″ E., on May 19, 1881, and why? Find the time, the establishment being $12^h\ 30^m$.

Double weight is assigned questions 1 and 2.

[The weather being unfavorable, questions 1 and 2 were omitted, and 3 and 4 substituted for them.]

FRENCH.

Translate the following into French:

ALFRED THE GREAT, KING OF ENGLAND.

At a period when England was torn by civil wars, and a prey to the cruelty of the Danes, a man appeared, destined by Providence to avenge his country, to defend its rights, to enlighten the age in which he lived, and to adorn humanity. Alfred the Great was the fourth son of Ethelwolf, king of England; he succeeded to the throne on the death of his brother Ethelred, in the year 871. After several actions with the Danes, the unfortunate Alfred was obliged to seek his safety by flight, and to retire to the cottage of one of his peasants, where he remained several months as a servant. He afterwards withdrew to the isle of Athelney, in Somersetshire, where, having heard that the earl of Devonshire had obtained a great victory over the Danes, and had taken their magical standard, he disguised himself as a harper, entered the enemies' camp, and was admitted to the principal generals, who praised his talents for music. Having acquired an exact knowledge of the situation of his enemies, and finding that they were divided among themselves, he seized the favorable moment, joined the earl, headed his troops, surprised the Danes at Eddington, in Wiltshire, and obtained a complete victory.

Having secured the peace of his dominions, after a great number of battles, which filled the enemies with terror, his next care was to police his kingdom. Although there remain but few of his laws, England owes to him many of those advantages which render her constitution so precious. The trial by jury is said to have been instituted by him. He caused learning to revive, and used his utmost endeavors to excite a love for letters among his subjects. He was himself a very learned prince, and all the hours he could take from business were devoted to study. When we consider the great qualities of Alfred, and his many virtues, we need not be surprised that his memory is still so dear to Englishmen.—*Addison.*

Translate the following into English:

AU RETOUR D'UNE LONGUE CAMPAGNE.

Un jour ou deux avant d'entrer, bien laver et nettoyer la peinture, surtout à l'avant du bâtiment et sous les cadènes; envoyer en bas les bouts-dehors de bonnettes pour les raboter légèrement, les renvoyer en haut et peindre leurs bouts.

Un coup de pinceau sur les éraillures des canots ainsi que sur les tangons, les échel-

les parées à mettre en place et si on est dans de bons parages, peindre l'extérieur aussi bas que possible, après l'avoir bien frotté.

Gratter les poulies mobiles de la mâture, etc., noircir les points de portage dans le gréement.

Le matin qui précède l'entrée, briquer les ponts, nettoyer les manches à vent, l'armement et la voilure des canots.

Gréer des hamacs propres le soir précédent, s'il en est besoin réellement.

Briquer et mettre en ordre les échelles de commandement; raidir à nouveau les étais de mâts de perroquets, visiter les marques des bras et balancines.

A l'approche du port, enlever les paillets de brasseyage, remplacer les jarretières de mer par des jarretières de rade, ou bien si celles-ci sont à poste fixe sur l'envergure, les noircir à nouveau; dédoubler les amures et écoutes des basses voiles, dépasser les fausses cargues des huniers, s'assurer que les ancres et les câbles sont clairs, que l'orin de la bouée est paré, que la bouée est peinte en noir, que les chaînes sont bien dégagées et que rien ne pend en dehors.

Si on doit mouiller sous voiles, en approchant du mouillage, faire monter le monde pour diminuer de toile et ne pas oublier d'avoir un armement de canot prêt à pousser pour dresser les vergues aussitôt l'ancre au fond; les factionnaires du pont seront prêts à se rendre à leurs postes, les hommes à l'extérieur parés avec leur échafaud et leur peinture, à aller en dehors une fois les voiles serrées.

Mouiller l'ancre du vent en arrivant au point voulu, filer la chaîne jusqu'à bonne distance et fermer, carguer ensuite les huniers et mouiller la seconde ancre, en embardant du bon bord, pour ne pas faire de tours de chaîne et tenir bon jusqu'à ce qu'on vire la chaîne, afin de ne pas surpatter l'ancre.

Serrer les voiles et terminer l'amarrage du bâtiment.

LA NAVIGATION ANCIENNE.

Jusqu'à la fin du siècle dernier, le navigateur devinait, autant qu'il la calculait, la position de son navire. Les chronomètres si répandus aujourd'hui étaient alors à l'essai. Les éphémérides nautiques mêmes contenaient des fautes. Les instruments de navigation avaient des degrés d'erreur, car ces grossiers arbalètes, astrolabes, cercles marins, arcs de navigation, n'avaient pas encore fait place aux bons sextants et aux excellents cercles de nos jours. Les exemples ne manquent pas de navires qui, traversant l'Atlantique à cette époque, se trouvaient de six, huit et même dix degrés de longitude au delà de leur estime. Tel est à présent le degré de perfection des tables et des instruments de navigation, que le marin peut aujourd'hui découvrir, avec une grande certitude, tout courant qui coupe sa route.

Conversation entirely in French.

Subjects:

Mon dernier itinéraire.

Une visite à bord d'un navire de guerre espagnol.

La force des différentes flottes étrangères.

Conversation avec un pilote français. Du poste des officiers pendant le combat. De la littérature étrangère, etc.

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